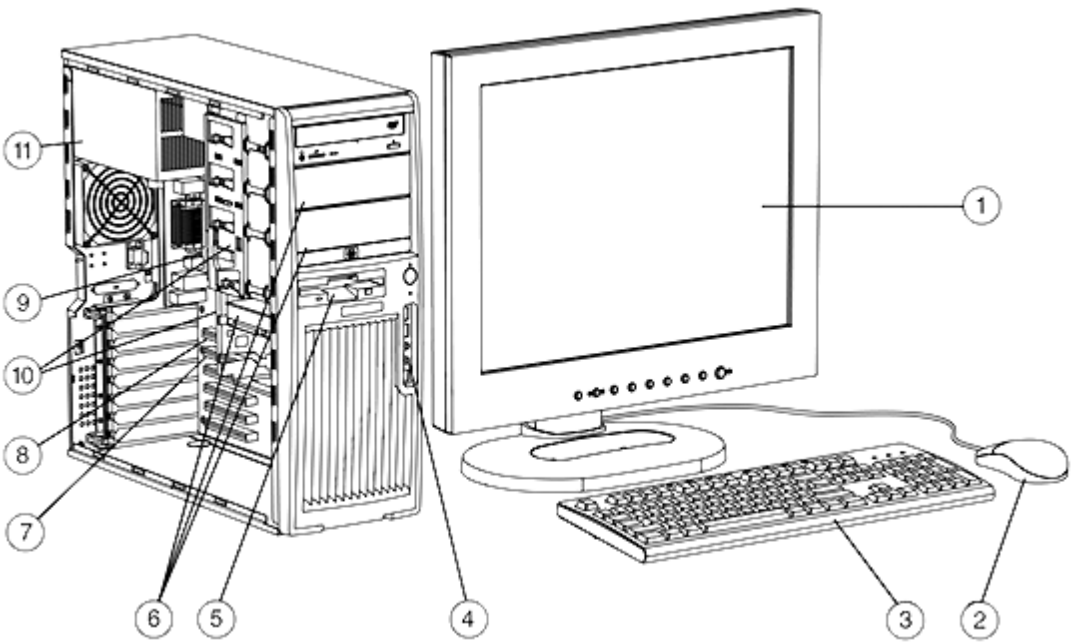
Overview



1. Monitor (sold separately)
2. 2-Button Scroll Mouse
3. Standard Keyboard
4. Front IO: 2 USB 2.0, IEEE-1394 (requires optional PCI card to enable), headphone and microphone
5. One 3.5" external bay for optional diskette drive or other 3.5" device
6. Three 5.25" external bays (3rd external is not full depth), and two 3.5" internal bays
7. 3 PCI slots, 1 PCI Express x1 slot, 1 PCI Express x16 slot (with x4 functionality)
8. 1 PCI Express x16 Graphics slot
9. Rear IO: 5 USB 2.0, 1 standard serial port, 1 optional serial port, 1 parallel port, PS/2 keyboard, PS/2 mouse, RJ-45, audio in, audio out, mic in
10. 1 USB 2.0 internal port
11. Intel® Core™ 2 Duo processor or Intel Pentium® D processor; both processors are EM64T capable
12. 460 watt (continuous) power supply

At A Glance

- Choice of Operating Systems:
  Microsoft Windows XP Professional (32-Bit),
  Microsoft Windows XP Professional x64 Edition,
  Microsoft Windows Vista™ enabled*,
  Preloaded: Red Hat Enterprise Linux® WS 4 (Update 4 or later) (32- or 64-bit version),
  HP Linux Installer Kit (see http://www.hp.com/workstations/software/linux)
- Red Hat Enterprise Linux WS 4 (Update 4 or later) (32- or 64-bit version)
- Red Hat Enterprise Linux WS 3 (Update 8) (32 or 64 bit version)
- For detailed OS/hardware support information for Linux, see: http://www.hp.com/support/linux_hardware_matrix
- Intel Core™ 2 Duo processor with Extended Memory 64 Technology (EM64T)
  - Dual-core
  - 1066 MHz Front Side Bus
  - 2 MB or 4 MB shared L2 cache
  - Virtualization Technology
- Intel® Pentium® D Processor with Intel Extended Memory 64 Technology (EM64T)
  - Dual-core
  - 4 MB dedicated L2 cache (2 MB per core)
- Intel 975X chipset
- Integrated HP Gbit LAN by Broadcom

Overview

- 1066 or 800 MHz processor front side bus support
- Convertible and tool-less minitower chassis
- 3 PCI Express slots/3 PCI slots
- Dual channel DDR2 memory at 667 MHz
- Four channel SATA Controller with RAID** 0, 1, 10, or 5 (Factory integrated RAID is Microsoft Windows only)
- Realtek integrated high definition audio with internal speaker
- Pre-loaded Manageability tools (Microsoft Windows only)
- Protected by HP Services, including a 3-3-3 standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply.

NOTE: * Not all Windows Vista features are available for use on all Windows Vista Capable PCs. All Windows Vista Capable PCs will run the core experiences of Windows Vista, such as innovations in organizing and finding information, security, and reliability. Some features available in premium editions of Windows Vista -- like the new Windows Aero™ user interface -- require advanced or additional hardware. Check http://www.windowsvista.com/getready for details.
** Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent, functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.

Standard Features - Custom Components

Processor and Speed – One of the following

All processors feature Intel Extended Memory 64 Technology (EM64T) and Intel Virtualization Technology

Intel® Core™ 2 Extreme X6800 Processor/ 2.93 GHz, 4 MB L2, 1066 FSB, Dual-Core

Intel Core 2 Duo E6700 Processor/ 2.67 GHz, 4 MB L2, 1066 MHz FSB, Dual-Core

Intel Core 2 Duo E6600 Processor/ 2.40 GHz, 4 MB L2, 1066 MHz FSB, Dual-Core

Intel Core 2 Duo E6400 Processor/ 2.13 GHz, 2 MB L2, 1066 MHz FSB, Dual-Core

Intel Core 2 Duo E6300 Processor/ 1.86 GHz, 2 MB L2, 1066 MHz FSB, Dual-Core

Intel® Pentium® D Processor 945/ 3.40 GHz, 2x1 MB L2, 800 MHz FSB, Intel® EM64T, dual-core

NOTE:

Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families. See http://www.intel.com/products/processor_number/ for details. Intel® EM64T requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel EM64T. Processor will not operate (including 32-bit operation) without an Intel EM64T-enabled BIOS.

erformance will vary depending on your hardware and software configurations. See http://www.intel.com/info/em64t for more information including details on which processors support Intel EM64T or consult with your system vendor for more information. Intel Virtualization Technology requires a computer system with a processor, chipset, BIOS, virtual machine monitor (VMM) and applications enabled for virtualization technology. Functionality, performance or other virtualization technology benefits will vary depending on hardware and software configurations. Virtualization technology-enabled BIOS and VMM applications are currently in development.

Operating System – One of the following

Genuine Windows XP Professional SP2 (32-Bit)

Genuine Windows XP Professional x64 Edition (64-Bit)

Preloaded: Red Hat Enterprise Linux WS 4 (Update 4 or later) (32- or 64-bit version)

HP Linux Installer Kit (see http://www.hp.com/workstations/software/linux):
Red Hat Enterprise Linux WS 4 (Update 4 or later) (32- or 64-bit version)
Red Hat Enterprise Linux WS 3 (Update 8) (32 or 64 bit version)
For detailed OS/hardware support information for Linux, see:
http://www.hp.com/support/linux_hardware_matrix

Standard Features - Custom Components

		Windows XP	Red Hat Linux
1-3 Hard Disk Drives – Up to 3 of the following SATA drives, or 3 of the following SAS drives	**SATA Hard Drives**		
	80 GB 7200 rpm SATA 3.0Gb/s drive	32-Bit, 64-Bit	WS 3, WS 4
	160 GB 7200 rpm SATA 3.0Gb/s NCQ	32-Bit, 64-Bit	WS 3, WS 4
	250 GB 7200 rpm SATA 3.0Gb/s NCQ	32-Bit, 64-Bit	WS 3, WS 4
	500 GB 7200 rpm SATA 3.0Gb/s NCQ	32-Bit, 64-Bit	WS 3, WS 4
	80 GB 10K rpm SATA 1.5Gb/s NCQ	32-Bit, 64-Bit	WS 3, WS 4
	160 GB 10K rpm SATA 1.5Gb/s NCQ	32-Bit, 64-Bit	WS 3, WS 4
	Serial Attached SCSI (SAS) Hard Drives		
	146 GB 10K rpm SAS 3.0Gb/s	32-Bit, 64-Bit	WS 3, WS 4
	73 GB 15K rpm SAS 3.0Gb/s	32-Bit, 64-Bit	WS 3, WS 4
	146 GB 15K rpm SAS 3.0Gb/s	32-Bit, 64-Bit	WS 3, WS 4
	300 GB 15K rpm SAS 3.0Gb/s (available CH2 2006)	32-Bit, 64-Bit	WS 3, WS 4

		Windows XP	Red Hat Linux
4th Hard Disk Drive – One of the following	**SATA 3Gb/s Hard Drives**		
	160 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	WS 3, WS 4
	500 GB 7200 rpm SATA 3.0Gb/s NCQ drive	32-Bit, 64-Bit	WS 3, WS 4
	Serial Attached SCSI (SAS) Drives		
	300 GB 15K rpm SAS 3.0Gb/s drive (available CH2 2006)	32-Bit, 64-Bit	WS 3, WS 4

		Windows XP	Red Hat Linux
Factory Integrated RAID (on motherboard for SATA drives)	RAID 0 Configuration - Striped Array (SATA or SAS)	32-Bit, 64-Bit	Not supported
	RAID 1 Configuration - Mirrored Array (SATA or SAS)	32-Bit, 64-Bit	Not supported
	RAID 10 Configuration - Striped/Mirrored Array (SATA or SAS, available CH2 2006)	32-Bit, 64-Bit	Not supported
	RAID 5 Configuration - Parity Array (SATA only, available CH2 2006)	32-Bit, 64-Bit	Not supported
	NOTE: Requires identical hard drives (speeds, capacity, interface). (HW RAID functionality not supported by Linux)		

Standard Features - Custom Components

Drive controllers		Windows XP	Red Hat Linux
	Integrated 4-channel SATA 3.0Gb/s controller with RAID* 0, 1, 10, 5, and NCQ	32-Bit, 64-Bit	WS 3 & WS 4 (HW RAID functionality not supported by Linux)
	Optional 4-port SAS LSI 3041E 3.0Gb RAID Card	32-Bit, 64-Bit	WS 3 & WS 4 (HW RAID functionality not supported by Linux)

* NOTE: Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.

Memory – One of the following		Windows XP	Red Hat Linux
	PC2-5300E ECC Unbuffered RAM DIMMs		
	HP 512 MB (2 x 256 MB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 1 GB (2 x 512 MB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 1.5 GB (2 x 256 MB + 2 x 512 MB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 2 GB (4 x 512 MB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 2 GB (2 x 1 GB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 3 GB (2 x 512 + 2 x 1 GB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 4 GB (2 x 2 GB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 4 GB (4 x 1 GB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 6 GB (2 x 1 GB + 2 x 2 GB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 8 GB (4 x 2 GB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4
	PC2-5300U Non-ECC Unbuffered RAM DIMMs		
	HP 256 MB (1 x 256 MB) PC2-5300U DDR2-667 non-ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 512 MB (2 x 256 MB) PC2-5300U DDR2-667 non-ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 1 GB (2 x 512 MB) PC2-5300U DDR2-667 non-ECC	32-Bit, 64-Bit	WS 3, WS 4
	HP 2 GB (4 x 512 MB) PC2-5300U DDR2-667 non-ECC	32-Bit, 64-Bit	WS 3, WS 4

NOTE: Do not mix ECC and non-ECC memory. The system will not boot if ECC and non-ECC DIMMs are mixed. Only unbuffered DDR2 DIMMs are supported. All DIMMs must be either x8 or x16 width.

Standard Features - Custom Components

Removable Storage	Windows XP	Red Hat Linux
No Floppy Drive option	N/A	N/A
1.44 MB Diskette Drive*	32-Bit, 64-Bit	WS 3, WS 4
48X CD-ROM	32-Bit, 64-Bit	WS 3, WS 4
16X DVD-ROM with +R Read	32-Bit, 64-Bit	WS 3, WS 4
48X CD-RW/DVD-ROM Combo	32-Bit, 64-Bit	WS 3, WS 4
16X DVD+/-RW, DL LightScribe**	32-Bit, 64-Bit	WS 3, WS 4

NOTE: * Not supported as a 2nd drive option.
** LightScribe creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. Double-layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

Input Devices	Windows XP	Red Hat Linux
Keyboard* – One of the following		
No Keyboard option	N/A	N/A
PS/2 Standard Keyboard	32-Bit, 64-Bit	WS 3, WS 4
USB Standard Keyboard	32-Bit, 64-Bit	WS 3, WS 4
Mouse – One of the following		
No Mouse option	N/A	N/A
PS/2 2-Button Scroll Mouse	32-Bit, 64-Bit	WS 3, WS 4
USB 2-Button Optical Scroll Mouse	32-Bit, 64-Bit	WS 3, WS 4
USB 3-Button Optical Mouse	32-Bit, 64-Bit	WS 3, WS 4

*NOTE: Mixing USB and PS/2 not supported in Linux - Both Mouse and Keyboard must be either PS/2 or USB.

Audio	Windows XP	Red Hat Linux
Integrated High Definition audio with internal speaker	32-Bit, 64-Bit	WS 3, WS 4
Sound Blaster X-Fi XtremeMusic Audio Card (Available CH2 2006)	32-Bit	Not Supported

NIC (Network Interface Controller)	Windows XP	Red Hat Linux
Integrated PCIe Broadcom 5751 Netxtreme Gigabit Ethernet NIC	32-Bit, 64-Bit	WS 3, WS 4

Standard Features - Custom Components

PCI Express Graphics – Up to two of the following*		Windows XP	Red Hat Linux
	HP No Graphics option	N/A	N/A
	Professional 2D		
	NVIDIA Quadro NVS 285 PCIe (128 MB)*	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro NVS 440 PCIe (256 MB)*	32-Bit, 64-Bit	Not supported
	Entry 3D		
	NVIDIA Quadro FX 560 PCIe (128 MB)	32-Bit, 64-Bit	WS 3, WS 4
	ATI FireGL V3300 PCIe (128 MB)	32-Bit, 64-Bit	WS 3, WS 4
	Mid-range 3D		
	NVIDIA Quadro FX 1500 PCIe (256 MB)*	32-Bit, 64-Bit	WS 3, WS 4
	High-end 3D		
	NVIDIA Quadro FX 3500 PCIe (256 MB)	32-Bit, 64-Bit	WS 3, WS 4
	ATI FireGL V7200 PCIe (256 MB)	32-Bit, 64-Bit	WS 3, WS 4
	NVIDIA Quadro FX 4500 PCIe (512 MB)	32-Bit, 64-Bit	WS 3, WS 4

NOTE:
* Two NVIDIA Quadro NVS 285 PCIe cards may be used together on any OS. Two NVIDIA Quadro FX 1500 PCIe cards may be used together on Windows XP 32-bit and x64. One NVIDIA Quadro NVS 440 PCIe and NVIDIA Quadro NVS 285 PCIe may be used together on Windows XP 32-bit.

Miscellaneous	Windows XP	Red Hat Linux
Solenoid lock and hood sensor	32-Bit, 64-Bit	WS 3, WS 4
Configure minitower in desktop orientation	32-Bit, 64-Bit	WS 3, WS 4
HP IEEE 1394a 3-Port PCI Card	32-Bit, 64-Bit	

Software	Windows XP	Red Hat Linux
Genuine Windows XP Professional*	32-Bit	
OR genuine Windows XP Professional x64 Edition*	64-Bit	
Red Hat Enterprise Linux WS 3 (64-bit)		WS 3, WS 4
HP Red Hat Linux Installer Kit (includes drivers for both 32-bit & 64-bit OS versions on xw8200, xw6200, xw4200, xw4300)		WS 3, WS 4
Alert Standard Format specification*	32-Bit, 64-Bit	
HP ProtectTools Software	32-Bit	
Symantec Norton AntiVirus 2005 (optional preinstall, Microsoft Windows XP Professional only)*	32-Bit	
Computer Associates® eTrust™ 64-bit AntiVirus (optional preinstall, Microsoft Windows XP Professional x64 Edition only)*	64-Bit	
HP Performance Tuning Framework*	32-Bit, 64-Bit	
Computer Associates eTrust 64-bit Anti-Virus Software	64-Bit	
Altiris Recovery* (optional download)	32-Bit, 64-Bit	
HP ProtectTools Security Manager* (optional download)	32-Bit, 64-Bit	
HP Client Manager Software v6.0* (optional download)	32-Bit, 64-Bit	
Microsoft Office 2003 Small Business Edition (optional preinstall - Microsoft Windows XP Professional only)	32-Bit	

Standard Features - Custom Components

Microsoft Office 2003 Basic (optional preinstall - Microsoft Windows XP Professional only)	32-Bit
Microsoft Office 2003 Professional	32-Bit, 64-Bit
CD/DVD software dependent on optical drive choices	32-Bit

* NOTE: Not available with Linux Operating System.

Standard Features - Specs

Form Factor	Minitower	
Color	Carbonite/Alloy metallic	
Convertibility	Yes. 5.25" drives rotate for Minitower or Desktop orientation.	
Expansion Slots (see mainboard section for more details)	• 3 PCI slots (full-height, full-length) • 1 PCI Express x16 slot (x4 functionality) • 1 PCI Express x1 slot • 1 PCI Express x16 graphics slot	
Expansion Bays (see storage section for more details)	• 2 internal 3.5" bays • 1 external 3.5" bay, 3 external 5.25" bays* NOTE: Third external 5.25" bay is not full depth in side orientation.	
Front I/O	2 USB 2.0, 1 IEEE 1394 (requires optional PCI card to function), 1 audio out, and 1 microphone. NOTE: Although HP Personal Workstations can be ordered with the HP Installer Kit for Linux and an IEEE 1394 card, HP cannot provide customer support for this configuration. Please refer to the Linux Hardware Support Matrix (http://www.hp.com/support/linux_hardware_matrix) for details, and to the Linux User Manual (http://www.hp.com/support/linux_user_manual) for tips on user-enablement of the IEEE 1394 Card.	
Internal I/O	1 USB 2.0 header	
Rear I/O	5 USB 2.0, 1 serial, 1 optional serial port, parallel port, 2 PS/2, RJ-45 (NIC), 1 audio in, 1 audio out, 1 microphone inches; audio/microphone ports can be made to function autosensing and interchangeably retaskable by downloading a driver)	
USB Keyboard	Optional	
USB Mouse	Optional	
PS/2 Keyboard	1	
PS/2 Mouse	1	
Interfaces Supported	1 SATA 3 Gb/s interface (4 SATA connectors), 1 EIDE interface for optical drives	
Hard Drive Controller (PCI) **Supported**	Optional Ultra320 or Ultra320 RAID (Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.)	
On-board RAID Support	Yes	
Chassis Dimensions (H x W x D)	17.7 x 6.6 x 17.9 inches; 45.0 x 16.8 x 45.6 cm 6.6 x 17.7 x 17.9 inches; 16.8 x 45.0 x 45.6 cm	
Weight	From 35.0 lb (15.88 kg), depending on configuration	
Shipping Weight	From 44.0 lb (19.96 kg), depending on configuration	
Temperature	Operating	40° to 95°F (5° to 35°C)
	Non-operating	-40° to 140°F (-40° to 60°C)
Humidity	Operating	8% to 85%
	Non-operating	8% to 90%
Maximum Altitude (non-pressurized)	Operating	10,000 feet; 3,000 m
	Non-operating	30,000 feet; 9,100 m
Power Supply	460 watts wide-ranging, active Power Factor Correction	

After-Market Options

PCI-Express Graphics	Windows XP	Red Hat Linux	Part Number
Professional 2D Multi Display Solutions			
NVIDIA Quadro NVS 285 PCIe	32-Bit, 64-Bit	WS 3, WS 4	EE061AA
NVIDIA Quadro NVS 440 PCIe (256 MB)	32-Bit, 64-Bit	WS 3, WS 4	PT453A
Entry 3D			
NVIDIA Quadro FX 560 PCIe (128 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES354AA
ATI FireGL V3300 PCIe (128 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES353AA
Mid-range 3D			
NVIDIA Quadro FX 1500 PCIe (256 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES355AA
High-end 3D			
NVIDIA Quadro FX 3500 PCIe (256 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES357AA
ATI FireGL V7200 PCIe (256 MB)	32-Bit, 64-Bit	WS 3, WS 4	ES356AA
NVIDIA Quadro FX 4500 PCIe (512 MB)	32-Bit, 64-Bit	WS 3, WS 4	EA762AA
NVIDIA Quadro G-Sync	32-Bit, 64-Bit	WS 3, WS 4	ED087AA

Hard Drives	Windows XP	Red Hat Linux	Part Number
SATA Hard Drives			
HP 80 GB 10K rpm SATA 1.5Gb/s	32-Bit, 64-Bit	WS 3, WS 4	EM172AA
HP 160 GB 10K rpm SATA 1.5Gb/s	32-Bit, 64-Bit	WS 3, WS 4	EW222AA
HP 80 GB 7200 rpm SATA 3.0Gb/s	32-Bit, 64-Bit	WS 3, WS 4	PY276AA
HP 160 GB 7200 rpm SATA 3.0Gb/s NCQ	32-Bit, 64-Bit	WS 3, WS 4	PV944A
HP 250 GB 7200 rpm SATA 3.0Gb/s NCQ	32-Bit, 64-Bit	WS 3, WS 4	EA788AA
HP 500 GB 7200 rpm SATA 3.0Gb/s NCQ	32-Bit, 64-Bit	WS 3, WS 4	PV943A
SAS Hard Drives	**Windows XP**	**Red Hat Linux**	**Part Number**
146 GB 10K rpm SAS 3.0Gb/s	32-Bit, 64-Bit	WS 3, WS 4	EM173AA
73 GB 15K rpm SAS 3.0Gb/s	32-Bit, 64-Bit	WS 3, WS 4	EA329AA
146 GB 15K rpm SAS 3.0Gb/s	32-Bit, 64-Bit	WS 3, WS 4	EA330AA
300 GB 10K rpm SAS 3.0Gb/s (available CH2 2006)	32-Bit, 64-Bit	WS 3, WS 4	RH937AA
300 GB 15K rpm SAS 3.0Gb/s (available CH2 2006)	32-Bit, 64-Bit	WS 3, WS 4	EM174AA

Controllers	Windows XP	Red Hat Linux	Part Number
SCSI Controllers			
LSI 3041E 4-Port SAS 3 Gb/s host adapter, supports RAID 0, 1 1E and 10E	32-Bit/64-Bit	Not supported	EH417AA

NOTE: Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.

After-Market Options

Removable storage devices		Windows XP	Red Hat Linux	Part Number
	512 MB USB 2.0 Drive Key II	32-Bit, 64-Bit	WS 3, WS 4	ED516AA
	1 GB USB 2.0 Drive Key II	32-Bit, 64-Bit	WS 3, WS 4	AG382AA
	1.44 MB Internal Floppy Drive	32-Bit, 64-Bit	WS 3, WS 4	DY670A
	HP 16-In-1 Media Card Reader with PCI Card	32-Bit, 64-Bit	WS 3, WS 4	EM718AA
	StorCase DX115 SATA Removable Enclosure	32-Bit, 64-Bit	WS 3, WS 4	EA332AA
	StorCase DX115 SAS Removable Enclosure	32-Bit, 64-Bit	WS 3, WS 4	EA333AA
	StorCase DX115 SATA/SAS HDD Carrier Tray	32-Bit, 64-Bit	WS 3, WS 4	RA697AA
	HP StorageWorks DAT 24 USB external tape drive	32-Bit, 64-Bit	WS 3, WS 4	DW070A
	HP StorageWorks DAT 24 USB internal tape drive	32-Bit, 64-Bit	WS 3, WS 4	DW069A
	HP StorageWorks DAT 40 USB external tape drive	32-Bit, 64-Bit	WS 3, WS 4	DW023A
	HP StorageWorks DAT 40 USB internal tape drive	32-Bit, 64-Bit	WS 3, WS 4	DW022A
	HP StorageWorks DAT 72 USB external tape drive	32-Bit, 64-Bit	WS 3, WS 4	DW027A
	HP StorageWorks DAT 72 USB internal tape drive	32-Bit, 64-Bit	WS 3, WS 4	DW026A
	HP StorageWorks DAT 72 SCSI external tape drive	32-Bit, 64-Bit	WS 3, WS 4	Q1523B
	HP StorageWorks DAT 72 SCSI internal tape drive	32-Bit, 64-Bit	WS 3, WS 4	Q1522B

Input Devices		Windows XP	Red Hat Linux	Part Number
	Keyboards			
	HP PS/2 Standard Keyboard	32-Bit, 64-Bit	WS 3, WS 4	DT527A
	HP USB Standard Keyboard	32-Bit, 64-Bit	WS 3, WS 4	DT528A
	HP USB Smart Card Keyboard (Carbonite/Silver)	32-Bit, 64-Bit	WS 3, WS 4	ED707AA
	Pointing Devices			
	HP PS/2 2-Button Scroll Mouse (mechanical)	32-Bit, 64-Bit	WS 3, WS 4	DD440B
	HP USB 2-Button Scroll Mouse (optical)	32-Bit, 64-Bit	WS 3, WS 4	DC172B
	HP USB 3-button mouse (optical)	32-Bit, 64-Bit	WS 3, WS 4	DY651A
	HP USB Spaceball 5000	32-Bit, 64-Bit	Not Supported	DV675A
	HP USB SpacePilot USB 3D Input Device	32-Bit, 64-Bit	Not Supported	EF390AA
	HP SpaceMouse Plus USB 3D Input Device	32-Bit, 64-Bit	Not Supported	DZ203A

Networking		Windows XP	Red Hat Linux	Part Number
	NICs			
	Intel Pro 1000 PT Gigabit PCI Express NIC	32-Bit	WS 3, WS 4	EH352AA
	Broadcom NetXtreme Gigabit Ethernet PCIe Adapter	32-Bit, 64-Bit	WS 3, WS 4	EA833AA

After-Market Options

Memory (Unbuffered DIMMs)		Windows XP	Red Hat Linux	Part Number
	PC2-5300 DDR2-667 DIMMs (ECC Unbuffered)			
	256 MB (1 x 256 MB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4	PV939A
	512 MB (1 x 512 MB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4	PV940A
	1 GB (1 x 1 GB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4	PV941A
	2 GB (1 x 2 GB) PC2-5300E DDR2-667 ECC	32-Bit, 64-Bit	WS 3, WS 4	PV942A
	PC2-5300 DDR2-667 Memory (non-ECC Unbuffered)			
	256 MB (1 x 256 MB) PC2-5300U DDR2-667 non-ECC	32-Bit, 64-Bit	WS 3, WS 4	PX974AA
	512 MB (1 x 512 MB) PC2-5300U DDR2-667 non-ECC	32-Bit, 64-Bit	WS 3, WS 4	PX975AA

Monitors	TFTs	Part Number
	HP LP2465 24-inch Flat Panel Monitor TFT	EF224A4
	HP L2065 20.1-inch Flat Panel Monitor TFT	EF227A4
	HP L1955 19.1-inch Flat Panel Monitor TFT	PD974A5

Multimedia		Windows XP	Red Hat Linux	Part Number
	Adaptec Fireconnect 2100 Firewire (1394) PCI Card (Windows only)	32-Bit, 64-Bit	Not supported	PA997A
	HP FireWire 800 IEEE 1394b PCI Card	32-Bit, 64-Bit	Not supported	EA327AA

NOTE: Although HP Personal Workstations can be ordered with the HP Installer Kit for Linux and an IEEE 1394a card, HP cannot provide customer support for this configuration. Please refer to the Linux Hardware Support Matrix (http://www.hp.com/support/linux_hardware_matrix) for details, and to the Linux User Manual (http://www.hp.com/support/linux_user_manual) for tips on user-enablement of the IEEE 1394a Card.

Audio		Part Number
	SoundBlaster X-Fi XtremeMusic Audio Card (Windows only, Available CH2 2006)	EA326AA
	HP Satellite Speakers	ZD929AA

After-Market Options

Optical Drives	Windows XP	Red Hat Linux	Part Number
DVD-ROM Drive			
16X DVD-ROM w/ +R read	32-Bit, 64-Bit	WS 3, WS 4	AA620B
CD-ROM Drive			
48X CD-ROM	32-Bit, 64-Bit	WS 3, WS 4	DC143B
Combo Drive			
48X DVD-ROM/CD-RW Combo (Roxio & WinDVD on Microsoft Windows)	32-Bit, 64-Bit	WS 3, WS 4	DE206B
DVD+/-RW Drive			
16X DVD+/-RW DL LightScribe *(LightScribe software works with Windows 32-Bit only.)	32-Bit, 64-Bit*	WS3 , WS 4*	DZ555B

NOTE: LightScribe creates a grayscale image similar to black and white photography. LightScribe media required and sold separately. Double-layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

Security (see software for HP ProtectTools)	Part Number
HP Solenoid Hood Lock/Sensor Kit	DE618A
HP Business PC Security Lock Kit	PV606AA
HP 2006 Business PC Security Lock Kit	EV265AA
Kensington Security Cable & Lock	PC766A

Racking Options	Part Number
HP xw400 Depth Adjustable Fixed Rail Rack Kit	EK729AA

Other Devices	Part Number
Agere 2006 PCI hi-speed modem (32- and 64-Bit)	EK694AA
Modem RJ11 Adapter Kit	DC131C
2nd serial port adapter	PA716A
Front Card Guide and Fan Guide Kit	DY648A
HP Optical Bay HDD Mounting Bracket	DY659A
HP 3-Port Internal SCSI Cable	DY661A
HP Power Cord Kit	DM293A
HP Internal USB Port Kit	EM165AA

Operating Systems	Part Number
Red Hat Enterprise Linux WS 4, Update 4 (32- and 64-bit) - available 2H 2006	XXXXX
Red Hat Enterprise Linux WS 3, Update 8 (32- and 64-bit) - available 2H 2006	XXXXX

After-Market Options

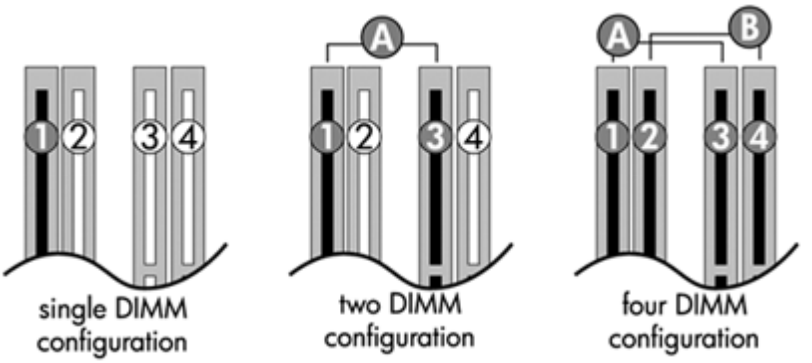
Software		Windows XP	Red Hat Linux	Part Number
	HP ProtectTools Quantity 1 Software	32-Bit, 64-Bit	Not supported	EM530AA
	HP ProtectTools Quantity 25 Software	32-Bit, 64-Bit	Not supported	EM531AA
	HP ProtectTools Quantity 500 Software	32-Bit, 64-Bit	Not supported	EM532AA
	HP Remote Graphics SW V3 for HP Systems LTU	32-Bit	Not supported	PY682AA
	HP Remote Graphics SW V3 Receiver LTU	32-Bit	Not supported	PY684AA
	HP Remote Graphics SW V3 CD-ROM Media	32-Bit	Not supported	PY685AA
	HP Remote SW for HP 1yr Update Subscription	32-Bit	Not supported	PN680A
	HP Remote SW Receiver 1yr Update Subscription	32-Bit	Not supported	PN682A

Intel 975X Express chipset

PC2-5300E DDR2-667 or PC2-5300U DDR2-667DIMMS

Only unbuffered DDR2 DIMMs (ECC unbuffered or non-ECC) are supported and must be either x8 or x16 width. Memory upgrades are accomplished by adding DIMMs of the same or varied sizes. The Intel 975X chipset supports both PC2-5300 DDR2-667 non-ECC and ECC unbuffered memory.

For best performance the total amount and type of memory loaded into Channel A and Channel B should be the same. If it is not, your computer will see all the RAM installed but will run the memory controller at a lower performance mode. Although not required, for best performance add the memory in pairs rather than as a single DIMM (two 512 MB DIMMs will have better performance than a single 1 GB DIMM). Also, add the memory into both channels (e.g. one in socket 1 and one in socket 3) to take advantage of dual channel performance. If you have unused slots within a channel, make them socket 2 and socket 4. This provides the best margin for the memory bus. If you are only using 1 DIMM, install it in socket 1.



MAXIMUM MEMORY

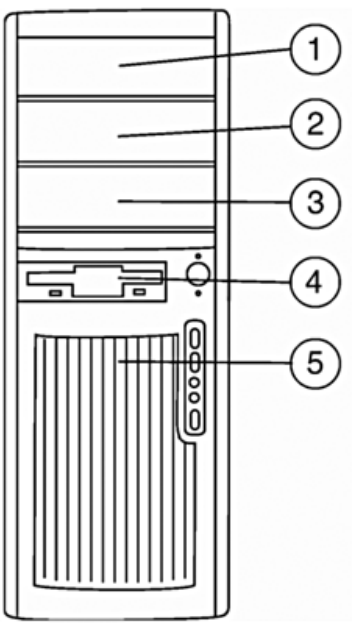
Supports up to 8 GB DDR2-667 ECC Unbuffered or 2 GB DDR2-667 non-ECC SDRAM

POSSIBLE MEMORY CONFIGURATIONS

Not all memory configurations possible are represented below.

DIMM Size	Slot			
	1	2	3	4
256 MB (single channel performance configuration)	256 MB			
512 MB	256 MB		256 MB	
1 GB	512 MB		512 MB	
1.5 GB	256 MB	512 MB	256 MB	512 MB
2 GB	1 GB		1 GB	
2 GB	512 MB	512 MB	512 MB	512 MB
4 GB	1 GB	1GB	1 GB	1GB
4 GB	2 GB		2 GB	
6 GB	1 GB	2 GB	1 GB	2 GB
8 GB	2 GB	2 GB	2 GB	2 GB

Tower configuration



	Quantity Supported	Position Supported	Controller
Convertible Minitower			
Optional Diskette Drive	1	4	Diskette
Optical Disk Drives	2	1, 2	IDE
Hard Disk Drives	2 standard (2 additional in Optical Bays via adapter) (4 SATA, 4 SAS)	5, 6 (and 2 or 3, for 3rd or 4th drives using optical bays, adapter kit(s) required)	SATA (and/or optional SAS) Factory Integrated RAID* 0, 1, 5, 10 (Levels 5, 10 available in 2H 2006) User configurable SATA RAID 0, 1, 10 standard

* NOTE: Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent, functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux. Linux does not support the mixing of SATA and SAS drives.

System Board	
Processor	One dual-core Intel Pentium D processor with Hyper-Threading Technology or one Intel® Core™ 2 Duo E6x00 or Core 2 Extreme series processor.
Processor Socket	Single LGA771
CPU Bus Speed Supported	800 and 1066 MHz FSB
Standard L2 Cache	2 or 4 MB L2 cache, depending on specific processor and number of cores
Chipset	Intel 975X North Bridge/ICH7R South Bridge
Super I/O Controller	SMSC SCH5317
System Board Form Factor	ATX 9.6 x 12 inches; 243.84 x 304.8 mm
Memory Expansion Slots	4 DDR2 memory slots
Memory Type Supported	1.8V DDR2 (ECC and non-ECC) memory modules, up to quad ranked
Memory Speed Supported	DDR2 SDRAM PC2-5300 (667 MHz) ECC DDR2 SDRAM PC2-5300 (667 MHz) non-ECC
Maximum Memory	8 GB (4 DIMM slots) NOTE: * Maximum memory capacities assume 64-bit operating systems, such as genuine Windows® XP Professional x64 Edition. Genuine Windows XP Professional (32-bit) supports up to 4 GB. 32-bit Linux supports up to 8 GB.
Memory Protection	ECC memory only - ECC available on data, parity on address and command
Memory Modes	Dual channel
DIMM Connectors (DDR2, 1.8V)	4 ECC support
PCI Express Connectors (v1.0a)	1 PCI Express x16 1 PCI Express x16 (x4 bandwidth) 1 PCI Express x1
PCI Connectors (5.0V)	3 full length 33 MHz 32-Bit
Interfaces Supported	1 SATA 3.0Gb/s interface (4 SATA connectors); 1 PATA interface (2 PATA connectors) for optical drives
Hard Drive Controller (PCI) Supported	Optional Serial Attached SCSI with RAID (Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.)
Integrated SATA RAID	• RAID 0, 1, 5, or 10 on a single array, up to 4 hard drives • Support for 1 or 2 RAID arrays on 4-ports for RAID 0 or 1 • RAID 1 spare and auto-rebuild • Matrix RAID support • AHCI support for NCQ drives • 3.0Gb/s drive support NOTE: Hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf for RAID capabilities with Linux.
Network Controller	Integrated Broadcom 5755 Gigabit Ethernet LoM
IEEE 1394a Connectors	1 optional connector

USB 2.0 Connectors	Front: 2 Rear: 5 Internal: 1
Wake-On-Lan®	Yes
HD Integrated Audio	Integrated high definition digital audio with S/PDIF 6-channel pass-through, stereo microphone, and Yamaha XG Lite Softsynth support NOTE: If using RHEL WS 3, the audio drivers are not included as part of the standard RHEL WS 3 operating system. Use the ALSA audio drivers included on the HP Driver CD or from the HP support website. See http://www.hp.com/support/linux_hardware_matrix and http://www.hp.com/support/linux_user_manual for details.
CD-ROM INCHES; Audio)	No
AUX INCHES; Audio)	Yes
Flash ROM	Yes
Clear CMOS Button	Yes
CPU Fan Header	Yes
Chassis Fan Header	Yes
Front Control Panel/Speaker Header	Yes
CMOS Battery Holder - Lithium	Yes
Hood Lock Header	Yes
Hood Sensor Header	Yes
Multibay Header	No
Integrated Trusted Platform Module	TPM 1.2
ASF 2.0 (Alert Standard Format)	Yes
Power Supply Headers	Yes
Power Switch, Power LED & Hard Drive LED Header	Yes
Password Clear Header	Yes

Cooling	
Chassis Fan	92 mm
Convertibility	70 or 80 mm
Processor Heatsink Fan	92 mm

Technical Specifications

Power Supply			
Full Ranging Input (Line Select Switch)	Yes		
Active Power Factor Correction (APFC) (Input Current is nearly 1/2 a non-APFC PS)	Yes		
Passive Power Factor Correction (PFC)	No		
Operating Voltage Range	90 - 264 VAC/118 VAC		
Rated Voltage Range	100 – 240 VAC		
Rated Line Frequency	50-60 Hz/400Hz		
Operating Line Frequency Range	47 – 66 Hz/393 – 407Hz		
Rated Input Current	7.4A/7.4A		
Maximum Rated Power	460 Watt Continuous		
Heat Dissipation	Typical 733.8 btu/hr Maximum 2415.4 btu/hr		
Power Supply Fan	92mm variable speed		
PS Size	3.84 x 5.91 x 6.05 inches; 97.6 x 150 x 153.71 mm		
Energy Star Compliant	Yes		
FEMP Standby Power Compliant (<2W in S5 - Power Off)	Yes if Wake-on-LAN disabled. System board may draw more power if Wake-on-LAN enabled.		
Power Consumption in ES Mode - Suspend to RAM (S3) (Instantly Available PC)	~2W (will depend on configuration)		
Surge Tolerant Full Ranging Power Supply	Withstands power surges up to 2000V		
Typical Configuration Power Consumption	To be tested		
	Input Power consumption	@ 120Vac/60Hz	
	Typical operating mode (system busy)	To be tested	To be tested
	Windows XP Idle	To be tested	To be tested
	Standby mode (S3)	To be tested	To be tested
	Hibernate mode (S4)	To be tested	To be tested
	Power Off (S5)	To be tested	To be tested
		* When Wake-on-LAN disabled	

ROM Features	
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
ASF 2.0 Compliant	Allows workstation status to be monitored on a remote console.
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot.
BIOS Power on	Users can define a specific date and time for the system to power on.

Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS.
Remote System Installation via F12 (PXE) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Enable or disables serial, parallel, USB, audio, and network ports
Removable Media Write Control/ Boot Control	User can prevent the workstation from writing to or booting from removable media
Power-On Password	Prevents an unauthorized person from booting up the computer
Setup Password	Prevents an unauthorized person from changing the system configuration
Replicated Setup	Saves BIOS settings to diskette or USB flash device in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering Computer Setup Utility (F10)
Memory Change Alert (Requires HP Client Manager Software)	Alerts management console if memory is removed or changed
Thermal Alert (Requires HP Client Manager Software)	Monitors the temperature state within the chassis. Three modes: • NORMAL - normal temperature ranges • ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown • SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
Remote Wakeup	• System administrators can power on, restart, and power off a client computer from a remote location.
ACPI (Advanced Configuration and Power Management Interface)	• Allows the system to enter and resume from low power modes (sleep states) • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system • Supports ACPI 2.0 for full compatibility with 64-bit operating systems
SMBIOS	System Management BIOS 2.3.5, previously known as DMI BIOS, for system management information
ROM revision levels	Identifies system ROM revision levels and reports in Computer Setup Utility (F10). Version is stored in an industry standard memory location (SMBIOS) so that management SW applications can use and report this information
System board revision level	• Allows management SW to read revision level of the system board • Revision level is digitally encoded into the HW and cannot be modified
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
Remote Wakeup/ Remote Shutdown	• System administrators can power on, restart, and power off a client computer from a remote location. • Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM.
ROM Based Setup (F10) and Start-up Diagnostics	Yes

Industry Standard	Revision Supported by the BIOS
ACPI	Advanced Configuration and Power Management Interface, Version 2.0
ASF	Alert Standard Format Specification, Version 2.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0
BBS	BIOS Boot Specification v1.01
BIOS 32-bit Services	Standard BIOS 32-bit Service Directory Proposal
CD Boot	"El Torrito" Bootable CD-ROM Format Specification Version 1.0
EDD	• Enhanced Disk Drive Specification Version 1.1 • BIOS Enhanced Disk Drive Specification Version 3.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	• PCI Local Bus Specification, Revision 2.3 • PCI Power Management Specification, Revision 1.1 • PCI Firmware Specification, Revision 3.0, Draft .7
PCI Express	PCI Express Base Specification, Revision 1.0a
PMM	POST Memory Manager Specification, Version 1.01
SATA	• Serial ATA Specification, Revision 1.0a • Serial ATA 3 Gb/s: Extensions to Serial ATA 1.5 Gb/s, Revision 1.0
SMBIOS	System Management BIOS Reference Specification, Version 2.4
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Computing Group TPM Specification Version 1.2
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB 1.1	Universal Serial Bus Revision 1.1 Specification
USB 2.0	Universal Serial Bus Revision 2.0 Specification

Other deployment & management features	
HP Client Management Solutions	HP Client Management Solutions help simplify management of Workstations and significantly reduce total ownership costs. HP has two distinct client management product lines. The first client management product line consists of HP OpenView Configuration Management Solutions and HP OpenView Client Configuration Manager. The second client management product line is comprised of the HP Client Premium Suite, HP Client Foundation Suite, and HP Client Manager To learn more about all of these solutions, visit http://www.hp.com/go/easydeploy

HP Client Manager	HP Client Manager is available for free for use with all HP business PCs, Notebooks, and Workstations. It enables central tracking, monitoring, and management of the hardware aspects of HP client systems: • Get valuable hardware inventory information such as CPU, memory, video, and security settings • Monitor system health to fix problems before they occur • Install drivers and BIOS updates without visiting each PC • Remotely configure BIOS and security settings • Automate processes to quickly resolve hardware problems Additional Altiris solutions (fee-based) are available to address Workstation management challenges through the entire IT lifecycle including: • Inventory assessment • Software license compliance • Personality migration • Software image deployment • Software distribution • Asset management • Problem resolution Visit http://www.hp.com/go/clientmanager for more information, to download HP Client Manager, and to evaluate the Altiris solutions
System Software Manager (free, Windows only)	A free utility that detects and updates BIOS, device drivers, and management agent versions on your networked PCs and workstations
HP Backup and Recovery Manager (included with PC, Windows only)	HP Backup and Recovery Manager saves your computer's software image on Recovery Discs (CDs or DVDs). You have the flexibility to save both the original factory software image that came with your HP computer and your software image that includes your customizations and data. These Recovery Discs enable full recovery of your computer should a critical hardware failure occur. Since HP now provides this simple tool to create your own Recovery Discs, HP commercial PCs that include HP Backup and Recovery Manager will not include factory restore CDs. HP Backup & Recovery Manager is preloaded on new HP commercial desktops, workstations, notebooks, and tablet PCs introduced starting March 2006*. For product availability, visit http://www.hp.com/go/easydeploy. *Up to 8 GB of the hard drive is reserved for the system recovery software.
Replicated Setup	Saves BIOS settings to diskette or USB disk-on-key in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup
Software Restore CD	Restores computer to its original factory shipping image
Asset Tag	• Repository for storing company-specific property asset numbers for easy tracking • Initially set equal to the system serial number • Stored in a protected section of non-volatile memory that can be accessed and modified with the F10 Setup program
DIMM Serial Presence Detect	Detects whether or not memory DIMMs are present and their type
Hard drive serial number, model, and manufacturer	Hard drive manufacturer, model, and serial number is stored in the hard drive firmware and reported in ROM-based F10 setup
Memory Change Alert (Requires HP Client Manager)	Alerts management console if memory is removed or changed
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen

Ultra ATA Integrity Monitoring (CRC Checking)	A feature of SATA and SCSI, Cyclic Redundancy Checking provides data transfer verification and proactive notification of hard drive data transmission problems with recommendations for enhancing system performance. It detects all the following errors' types: • single-bit errors • double-bit errors • an odd number of errors • error bursts up to 32-bits long
Drive Self Tests (DPS)	• Drive Protection System (Adaptec and LSI SCSI controllers do not offer DPS) • A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user. • Running independently of the operating system, it can be accessed through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced. The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures DPS Access through F10 Setup during Boot (F10 diagnostic access not available with SCSI drives)
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count. By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure. SMART I – Drive Failure Prediction SMART II – Off-Line Data Collection SMART III – Off-Line Read Scanning with Defect Reallocation

Security Features	
Padlock support	Padlock loop in rear of chassis. Locks side cover and secures chassis from theft. (0.22" diameter)
Cable Lock Support	Kensington lock slot in rear of chassis. Locks side cover and secures chassis from theft. (3mm x 7mm opening)
Universal chassis clamp lock support	Threaded feature in rear of chassis. Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable.
Solenoid lock and hood sensor	Yes
Rear Port Control Cover (optional)	Locks rear IO cables to prevent cable theft.
Serial, Parallel, USB Enable/Disable	Enable or disable serial, parallel or USB ports and hide them form the operating system
Removable Media Write/ Boot Control	Prevents the computer from being booted from removable media on supported devices (and can disable writes to media)
Power-On Password	Prevents an unauthorized person from booting up the computer
Setup Password	Prevents an unauthorized person from changing the system configuration

Technical Specifications

System Software Updating	
Product Change Notification	• Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile. • PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition. • Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console
Remote Wakeup/ Remote Shutdown	• System administrators can power on, restart, and power off a client computer from a remote location. • Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM.
ROM Based Setup (F10) and Start-up Diagnostics	Yes
Support Software CD & WWW	Yes

Other Features	
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • Allows the system to wake from a low power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system

Serviceability Features of System	
Access Panel	Tool-less
Optical Drives	Tool-less
Floppy Drive	Tool-less
Hard Drives	Tool-less
Expansion Cards	Tool-less
Green user touch points	Yes, on tool-free internal chassis mechanisms
Color-coordinated cables and connectors	Yes
Memory	Tool-less, can be upgraded without removing any internal components
System Board	Tool-less removal
Dual Color Power and HD LED on Front of Computer (Indicates Normal Operations and Fault Conditions)	green – normal red – fault
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS.
Configuration Record SW	Yes
Over-Temp Warning on Screen (Requires IM Agents)	Yes
Restore CD set	Restores the computer to its original factory shipping image
Flash ROM	Yes

3.3V Aux Power LED on System PCA	Yes
Dual Function 5V Aux Power LED (ON)/PS_ON LED (OFF) on System PCA	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder for easy Replacement	Yes
Processor ZIF Socket for easy Upgrade	Yes
DIMM Connectors for easy Upgrade	Yes
NIC LEDs (integrated) (Green & Amber)	Used to determine NIC status
ASF 1.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
Dual Function Front Power Switch	Also acts as a reset switch when held for 4 seconds

Service and Support	On-site Warranty and Service (Note 1): This three-year, limited warranty and service offering delivers three years of on-site, next business-day (Note 2) service for parts and labor and includes free telephone support (Note 3) 24 x 7. Global coverage (Note 2) ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.
	NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.
	NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
	NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

Eco-Label Certifications & Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • US Energy Star (Windows only) • US Federal Energy Management Program (FEMP) • China Energy Conservation Program • IT ECO declaration • Japan PC Green label* *NOTE: This product conforms to the examination standards (2003 version) under JEITA's 'PC Green Label System.'

Technical Specifications

Energy Consumption and Noise Emissions							
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Convertible Mini tower Desktop model is based on a "Typically Configured Desktop"						
	Processor Info	2x2 GHz					
	Memory Info	4x1 GB 667 MHz					
	Graphics Info	FX 1500					
	Disks/Optical/Floppy	2x 80 GB SATA / 1 Optical / 1 Floppy					
Energy Consumption		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	To be tested		To be tested		To be tested	
	Windows Busy (S0)	To be tested		To be tested		To be tested	
	Sleep (S3)	To be tested	To be tested	To be tested	To be tested	To be tested	To be tested
	Off (S5)	To be tested	To be tested	To be tested	To be tested	To be tested	To be tested
Heat Dissipation**		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	To be tested		To be tested		To be tested	
	Windows Busy (S0)	To be tested		To be tested		To be tested	
	Sleep (S3)	To be tested	To be tested	To be tested	To be tested	To be tested	To be tested
	Off (S5)	To be tested	To be tested	To be tested	To be tested	To be tested	To be tested
	NOTES: * Energy Star low energy mode ** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour. This product is in compliance with US executive order 13221, WOL (wake on LAN) disabled.						
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWad, bels)		Deskside Sound Pressure (LpAm, decibels)			
	Idle	To be tested		To be tested			
	Fixed Disk (random writes)	To be tested		To be tested			
	Optical Drive (sequential reads)	To be tested		To be tested			
Longevity and Upgrading	This product is designed to be upgraded, possibly extending its useful life by several years. Spare parts are available throughout the warranty period and for up to 5 years after the end of production. Upgradeability features contained in the product include: • Intel LGA775 processor socket • 4 USB ports • 3 PCI slots and 3 PCI Express slots • 5 storage bays • 4 memory slots						

Batteries

This product complies with ISO standards:

- EU Directive 91/ 157/ EEC
- EU Directive 93/ 86/ EEC
- EU Directive 98/ 101/ EEC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 4000ppm by weight.

Battery size: CR2032 (coin cell)
Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% recycled materials (by wt.)
- This product is >90% recycle-able when properly disposed of at end of life.

Packaging Materials		
External	Cardboard carton and insert	2.70 kg
Internal	LDPE Foam	0.35 kg

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Diphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tinches; TBT), Triphenyl Tinches; TPT), Tributyl Tin Oxide (TBTO)

Packaging	HP follows these guidelines to decrease the environmental impact of product packaging: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-Life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.
Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: [link to new HP white paper now in progress] Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html

Technical Specifications - Audio

Integrated Intel/Realtek HD ALC260 Audio	Type	Integrated
	High Definition Codec	Yes
	FM Synthesis Support	Yes
	OPL3 FM Synthesis Support	Yes
	Sound Blaster Compatibility	Yes
	SPDIF 6-channel pass-through	No
	Audio Jacks	One Front fixed stereo analog Microphone-Inches; 20-K ohm Input Impedance) One Front fixed stereo Headphone-Out (expects at least a 32ohm load) One Line-In* (12-K ohm Input Impedance)* One Line-Out * (less than 800 ohms Output Impedance, expects at least a 10-K ohm load) One Stereo analog Microphone-In* (20-K ohm Input Impedance) NOTE: *Rear audio port are re-taskable as Line-In, Line-Out, Microphone-In, or Headphone-Out with Optional driver, available only through download from HP support website and not supported by default. External Speakers need to be powered externally.
	Sampling	44.1 kHz/48 kHz/96 kHz/192 kHz (output only)
	Wavetable Syntheses (software)	Yes - GM and FM Midi Support, Direct Music and Down Loadable Soundset (4 Meg DLS Level 1 and 2 Support)
	3D Positional Sound	No
	Digital Audio	Yes
	Analog Audio	Yes
	DVD Audio	Yes
	Number of Channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
	Internal Audio Speaker Power Rating	1.5 W
	Internal Speaker	Yes
	Hardware Equalizer for Internal Speaker	No
	External Speaker Jack (Line-Out)	Yes
Sound Blaster X-Fi XtremeMusic (PCI) (Available CH2 2006)	Audio Quality	Total Harmonic Distortion + Noise at 1kHz (20kHz Low-pass filter) = 0.004%
	Signal to Noise Ratio (SNR)	Signal-to-Noise Ratio (20kHz Low-pass filter, A-Weighted) • Stereo Output: 109dB • Front and Rear Channels: 109dB • Center, Subwoofer and Side Channels: 109dB

Technical Specifications - Audio

Sound Conversion	24-bit Analog-to-Digital conversion of analog inputs at 96kHz sample rate 24-bit Digital-to-Analog conversion of digital sources at 96kHz to analog 7.1 speaker output 24-bit Digital-to-Analog conversion of stereo digital sources at 192kHz to stereo output	
Recording/Sampling Rate	44.1, 48 and 96kHz	
ASIO 2.0 support	16-bit/44.1kHz, 16-bit/48kHz, 24-bit/44.1kHz 24-bit/48kHz and 24-bit/96kHz with direct monitoring	
Enhanced SoundFont support	up to 24-bit resolution 24-bit/96kHz	
DACs	24-bit/192kHz	
Voice Support	128 voices	
Max. Channels in 3D Positional Audio	7.1	
EAX® ADVANCED HD™ 5.0 support	Yes including EAX® MacroFX™, EAX® PurePath™ and Environment FlexiFX™	
Connectors	FlexiJack (Performing a 3-in-1 function, Digital In / Line In / Microphone) via 3.50 mm minijack Line level out (Front / Rear / Center / Subwoofer / Rear Center) via 3.50 mm minijacks AUX_IN line-level analog input via 4-pin Molex connector on card One AD_Link (26 pin) connector for linking to the X-Fi I/O Console (upgrade option)	
Dimensions	7.25" x5" x .9"	
Additional product features	Movies	THX Certification Dolby Digital EX 6.1 Playback DTS-ES 6.1 Playback
	Music	X-Fi 24-bit Crystalizer CMSS-3D SuperRip
	Audio Creation	Pristine audio playback quality with a near transparent SRC engine Up to eight 24 bit hardware effects ASIO recording with latency as low as one millisecond 24-bit SoundFont® sampling 3D MIDI
	Gaming	EAX ADVANCED HD 5.0

	Software Bundle	Doom 3 Sound Blaster EAX patch Entertainment Mode Audio Creation Mode Game Mode Mode Switcher Audio Console Creative MediaSource Creative MediaSource DVD-Audio Player DTS Neo:6 Settings Karaoke Player Entertainment Center Smart Recorder SoundFont Bank Manager Speaker Connection Wizard THX Setup Console Vienna SoundFont Studio Volume Panel WaveStudio Console Launcher Creative Media Toolbox Creative Diagnostics
Minimum system requirements	System RAM	256MB
	Hard disk	600MB free space Available PCI 2.1 slot for the audio card CD-ROM/CD-RW or CD/DVD-ROM required for software installation
	Operating System	Microsoft Windows XP Service Pack 2 (SP2)

Technical Specifications - Communications

Integrated PCI Express Broadcom BCM5755 NetXtreme Gigabit Ethernet Network Controller LoM	Connector	RJ-45
	Controller	Broadcom 5755 PCI-E LAN Controller
	Memory	Integrated 64KB receive buffer and 8KB transmit buffer
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI-E 1.0a
	Data path width	X1
	Data path speed	2.5Gbit per sec per direction transfer rate
	Data transfer mode	Bus-master DMA
	Hardware certifications	
	Power requirement	1.5 watts @ +3.3V AUX supply
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T, 1000 Mbps
	Operating system driver support	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux 3
	Management capabilities	WOL, PXE
	Alerting	ASF 2.0

Intel Pro 1000 PT PCI Express Gigabit NIC (Part# EH352AA)	Connector	RJ-45
	Controller	Intel 82572EI Gigabit Ethernet Controller
	Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.1P, 802,1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI-E 1.0a
	Data path width	X1, 250MB/s, Bi-directional interface
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power requirement	Aux 3.3V, 3.0 Watts in 1000base-T and 2.0 Watts in 100Base-T
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T, 1000 Mbps
	Environmental	Operating temperature 32° to 131° F (0° to 55° C) Operating humidity 85% at 131° F (55° C)
	Dimensions	6.4 x 2.6 x 0.8 inches; 16.3 x 6.6 x 1.9 cm)

Technical Specifications - Communications

	Operating system driver support	Microsoft Windows NT 4.0, Microsoft 2000, Microsoft XP, Red Hat Linux 7.2, Linux 7.3 and Red Hat Enterprise Linux WS 3
	Management capabilities	ASF, WOL , PXE, DMI, WFM 2.0.
	Kit contents	Intel Pro 1000 PT PCI Express Gigabit NIC, CD containing Intel PROset II NIC drivers, quick install guide, product warranty statement
Broadcom BCM5751 NetXtreme Gigabit Ethernet Controller (PCIe) (Part# EA833AA)	Connector	RJ-45
	Controller	Broadcom 5751 PCI-E 1.0a LAN Controller
	Memory	Integrated 96Kb frame buffer memory
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI-E 1.0a
	Data path width	X1
	Data path speed	2.5Gbit per sec per direction transfer rate
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC class B, NRTL Mark Canada and United States, C-Tick for Australia, BSMI for Taiwan, VCCI for Japan, MIC for Korea, GOST for Russia
	Power requirement	3.1 watts @ +3.3V AUX supply
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T, 1000 Mbps
	Environmental	Operating temperature 32° to 131° F (0° to 55° C) Operating humidity 85% at 131° F (55° C)
	Dimensions	4.4 x 2.2 x 0.08 inches; 11.2 x 5.5 x .2 cm
	Operating system driver support	Microsoft Windows 2000 and XP, Red Hat Linux 7.2, 7.3 and Red Hat Enterprise Linux 3
	Management capabilities	WOL, PXE , Remote cable management
	Alerting	ASF 2.0
	Kit contents	Broadcom 5751, CD, Broadcom NetXtreme Gigabit Ethernet PCI NIC, drivers, quick install guide, product warranty statement
Agere Systems PCI International Softmodem	Data Transmission	Technology speeds: 56,000 Kbps maximum downstream data, controllerless NOTE: 56 Kbps technology refers to download speeds only and requires compatible modems at server sites. Other conditions may limit modem speed. FCC limitations allow a maximum of 53 Kbps during download transmissions.
	Data Speeds	(Upload only) 33,600/31,200/28,800/26,400/21,600/19,200/16,800/14,400/12,000/9,600/7,200/4,800/2,400/1,200/300
	Data Standards	ITU-T V.90, ITU-T, ITU-T V.34, V.44, V.42, V.42bis21, V.32bis, Bell 212A, and Bell 103
	Fax Speeds	14,400/12,000/9,600/7,200/4,800/2,400/1,200/300 b/s

Technical Specifications - Communications

Fax Mode Capabilities	ITU-T T.31 class 1 FAX, V. 17, V.29, V.27ter, and V.21 Channel 2
Error Correction and Data Compression	V.44, 42bis, V.42 and MNP2-5
Power Management	ACPI; PPMI 1.1 and wake support with PME and Vaux; meets PCI 2.3 requirements and PC 2001 requirements
Upgradeability	Driver upgradeable for future enhancements
Video	ITU-T V.80 video ready interface
Other	TIA/EIA 602 standard AT command set
	Integrated DTE interface with speeds of up to 115.2 Kbps, parallel 16550a UART-compatible interface
	Optional ring wakeup signal
Operating Temperature	32° to 158° F (0° to 70° C)
Operating Humidity	20% to 90%, non-condensing
Operating System Support	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition
OS Driver Support	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition
Power	Requires a 3.3-V auxiliary power rail on PCI bus
	Uses only one PCI load (i.e., one grant/request pair), one shared IRQ, one electrical load
Chipset	Agere Systems SV92PL - Integrated PCI interface with 5-V tolerant buffers and CardBus support
Dimensions (L X H)	Complies with PCI low profile specifications-6.7 x 2.3 inches; 17.0 x 5.8 cm and supports high- and low-profile brackets
Connection	Single RJ-11 connector
Other Features	Digital line protection, call progress monitoring via on-board piezo device, support for high profile and low profile brackets, PnP ID support
Safety	UL recognized to UL 1950, 3rd edition (U.S. and Canada); IEC 950 (TUV, NEMKO, DEMKO, SEMKO); CE Mark, EC 950 (TUV, NEMKO, DEMKO, SEMKO, CE mark
EMC	FCC Part 15, IC ES003, EN 55022, 3rd edition, EN 55024, annex A, EN 61000-4-6, EN 61000-4-8
Telecom	FCC Part 68, IC-CS-03 (Canada); Worldwide PTT approvals Not available in Korea or the Republic of South Africa.
Health	Bare PCB material compliant to 94V-0 or better (marked as such)
Other	PC 2001 compliant, PCI version 2.3, WHQL approved; ACPI compliant
Kit Contents	DC132D : Agere Systems PCI International Softmodem with full-height bracket attached, additional low-profile bracket, RJ11 modem cable, driver and documentation CD.
	NOTE: RJ11 modem adapter is not included.
	DC131C #xxx: RJ11 modem adapter kit for use with DC132D
	#ACP: Austria, #ABW: Belgium (Dutch/Flemish), #AKN: Bosnia, Herzegovna, Croatia, Slovenia, Yugoslavia (Slovenian), #AKB: Czech Republic (Czech) & Slovakia, #ABF: France, #ABD: Germany, #AB7:

LSI SAS3041E Serial Attach SCSI (SAS) Host Bus Adapter (HBA) (Part# EH417AA)

PCI Bus	PCI-Express x4 lanes	
PCI Modes	Bus Master DMA	
PCI data burst transfer rate	1.0 GBps (half duplex) 2.0 GBps (full duplex)	
SAS Bandwidths	**Half Duplex** Single lane – 300 MBps Wide Port (2 lanes) – 600 MBps Wide Port (4 lanes) – 1200 MBps	**Full Duplex** Single SAS Lane – 600 MBps Wide Port (2 lanes) –1200 MBps Wide Port (4 lanes) – 2400 MBps
PCI Card Type	3.3 volt add-in card	
PCI Voltage	12 V ± 10%	
PCI Form Factor	6.6" x 2.731" (Low-profile)	
PCI Power	7.5 Watts	
Bracket	Full height and Low-profile	
Certification Level	PCI-Express 1.0a	
IO Bus	Four 3Gbps SAS/SATA ports	
SAS Processor	LSISAS1064E	
Internal Connectors	Four- SATA x1 connectors	
External Connectors	None	
Max. Number of SCSI Devices	128	
LED Indicators	On-board activity and fault LEDs	
Integrated Mirroring	Integrated Mirroring option available	
Environments	**Operating**	**Storage**
Temperature	32° to 140° F (0° to 60° C)	-49° to 221° F (-45° to +105° C)
Relative Humidity	5% to 90% non-condensing	5% to 90% non-condensing
MTBF	>200,000 hours	
Compliances	EMC: Class B-US (CFR 47, P15B); Canada (ICES-003); Japan (V-3/02.04); Europe (EN55022/EN55024); Australia/New Zealand (AS/NZS 3548); Safety: EN60950	
Operating system support	Microsoft Windows XP Professional, XP Professional x64 Red Hat Linux 7.2, 7.3, WS3 and WS4	
Kit contents	Controller card, driver CD, LED cables, user documentation and warranty card.	

SATA 3.0Gb/s hard drives 80 GB (7,200 rpm)	**Capacity**	80,026,361,856 bytes	
	Height	1 inches; 2.54 cm or less	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s)	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Cache	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
		Average	11.0 ms
		Full-Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	156,301,488	
	Operating Temperature	41° to 131° F (5° to 55° C)	
160 GB (7,200 rpm)	**Capacity**	160,041,885,696 bytes	
	Height	1 inches; 2.54 cm or less	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.9 ms
		Average	11.0 ms
		Full-Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	312,581,808	
	Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Drives

250 GB (7,200 rpm)	**Capacity**	250,059,350,016 bytes	
	Height	1 inches; 2.54 cm or less	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.0 ms
		Average	11.0 ms
		Full-Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	488,397,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
500 GB (7,200 rpm)	**Capacity**	500,107,862,016 bytes	
	Height	1 inches; 2.54 cm or less	
	Width	Media diameter: 3.5 inches; 8.89 cm Physical size: 4 inches; 10.2 cm	
	Interface	Serial ATA (3.0 Gb/s), Native Command Queuing enabled	
	Synchronous Transfer Rate (Maximum)	Up to 300 MB/s	
	Buffer	8 MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	1.3 ms
		Average	20.0 ms
		Full-Stroke	30 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	976,773,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Drives

Serial Attached SCSI (SAS) hard drives	146 GB (10K rpm)	Capacity	146,815,737,856 bytes	
		Height	1.0 inches; 25.4 mm	
		Width	4.0 inches; 101.6 mm	
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
		Buffer	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	.3 ms
			Average	<4.5 ms
			Full-Stroke	<11.0 ms
		Rotational Speed	10,000 rpm	
		Logical Blocks	286,749,488 – 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	
	73 GB (15K rpm)	Capacity	73,407,856,856 bytes	
		Height	1.0 inches; 25.4 mm	
		Width	4.0 inches; 101.6 mm	
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
		Buffer	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.27 ms
			Average	3.5 ms
			Full-Stroke	7.4 ms
		Rotational Speed	15,000 rpm	
		Logical Blocks	143,374,738 – 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	
	146 GB (15K rpm)	Capacity	146,815,737,856 bytes	
		Height	1.0 inches; 25.4 mm	
		Width	4.0 inches; 101.6 mm	
		Interface	SAS	
		Synchronous Transfer Rate (Maximum)	3.0 Gb/s	
		Buffer	8 MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.27 ms
			Average	3.5 ms
			Full-Stroke	7.4 ms
		Rotational Speed	15,000 rpm	
		Logical Blocks	286,749,488 – 512 byte blocks	
		Operating Temperature	50° to 95° F (10° to 35° C)	

Technical Specifications - Removable Storage

USB Disk on Key	Dimensions (HxWxD)	0.9 x 0.7 x 3.9 in (2.3 x 1.8 x 9.8 cm)
	Weight	0.05 lb (0.02 kg)
	USB Specification	2.0
	Transfer Rate	Read–1023 KB/Sec; Write–850 KB/Sec
	Storage Media	Solid state flash memory, no moving parts
	Power Supply	USB Bus-powered, no external power required
	Capacity	512 MB or 1 GB

HP IEEE 1394a FireWire 4-Port PCI Card (Windows XP Only) (Part# PA997A)	**Device Interface Protocol**	IEEE-1394a	
	Data Rate	400 Mbps	
	Devices Supported	IEEE-1394 compliant devices	
	Bus Interface	PCI	
	Physical	PCI card with brackets for low profile and full height PCI slots.	
	Environmental	**Operating temperature**	50° to 131° F (10° to 55° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Relative humidity	20% to 80%
	Ports	Two IEEE1394 6-Pin Connector (Rear)	
	Connectors	One 10-Pinches; 9 Contacts) Custom Connector (Internal)	
	Minimum System Requirements	Microsoft Windows XP Professional, Windows XP Home, not supported on Linux	
		Pentium II 266 or above	
		128-MB RAM	
		1-GB Hard Drive	
		CD-ROM drive	
		Built-in sound system	
		Available PCI slot	
	Regulatory Agency Approval	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC	

HP IEEE 1394b FireWire 800 3-Port PCI Card (Windows XP Only) (Part# EA327AA)	**Device Interface Protocol**	IEEE-1394	
	Data Rate	800 Mbps	
	Devices Supported	IEEE-1394 compliant devices	
	Bus Interface	PCI	
	Physical	PCI card with brackets for low profile and full height PCI slots.	
	Environmental	**Operating temperature**	50° to 131° F (10° to 55° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Relative humidity	20% to 80%
	Ports	Two IEEE-1394b bilingual 9-Pin Connector (Rear)	
	Connectors	One 10-Pin header Custom Connector (Internal)	
	Minimum System Requirements	Microsoft Windows XP Professional, Windows XP Home, not supported on Linux	
		Pentium III	
		128-MB RAM	
		1-GB Hard Drive	
		CD-ROM drive	
		Built-in sound system	
		Available PCI slot	
	Regulatory Agency Approval	FCC Part 15B, cULus 60950, CE Mark EN55022B(1995)/EN55024-1998 STD, Taiwan BSMI CNS13438, Korea MIC	

HP StorCase Removable Enclosures (Model EA333AA for SAS Model EA332AA for SATA)	Physical characteristics	Dimensions of carrier (H x W x D)	1.07 x 4.34 x 7.54 inches; 27.2 x 110.2 x 191.5 mm
		Weight of carrier	1 lbs (0.45 kg)
		Dimensions of receiving frame (H x W x D)	1.62 x 5.75 x 7.88 inches; 41.1 x 146.1 x 200.2 mm
		Weight of receiving frame	N/A
		Dimensions of receiving frame - including front bezel (H x W x D)	1.62 x 5.81 x 8.08 inches; 41.1 x 147.6 x 205.2 mm
		Weight of receiving frame - including front bezel	2 lbs (0.91 kg)[1]
		Features	Allows you to mount a low-profile (up to 1 inch high) 3.5" form factor drive into any half-height, 5.25" peripheral bay Supports Serial Attached SCSI (SAS) or SATA 3.0Gb/s drives • Drive carrier key lock • Drive spin/power up/down button • Power, spin, and fan failure indicator • Drive activity indicator • Soft Start circuitry & anti-static device protection • Cable-less drive connector • 50K mating connector • Cooling fan
	Electrical	Input	+5V 9mA / +12V 20 µA
	Chassis reliability/ maintainability	MTBF (at 30° F)	600,000 hours
		MTTR	5 minutes
	Environmental	Operating ambient temperature	32° to 122° F (0° to 50° C)
		Storage ambient temperature	-40° to 158° F (-40° to 70° C)
		Operating relative humidity[2]	5% to 95%
		Storage relative humidity[2]	50% to 95%
		Operating altitude	1000 to 10,000 ft (-305 to 3048 m)
		Storage altitude	-1000 to 40,000 ft (-305 to 12,195 m)
		Operating shock[3]	60g
		Storage shock[3]	30

[1]With carrier removed
[2]Non-condensing with maximum gradient of 10% per hour
[3]Half-sine wave shock pulses at 2ms

Technical Specifications - Peripherals

PS/2 OR USB Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 inches ; 45.8 x 16.3 x 2.5 cm
		Weight	2 lbs (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		ESD	CE level 4, 15-kV air discharge
		EMI – RFI	Conforms to FCC rules for a Class B computing device
		MicrosoftPC 99 – 2001	Functionally compliant
	Mechanical	Languages	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Operating system support	Microsoft Windows XP Professional, Microsoft Windows XP Professional x64 Edition, Red Hat Enterprise Linux WS 3 and WS 4	
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
	Kit contents	Keyboard, keyboard software media, installation guide, warranty card, safety and comfort	
HP USB Smart Card Keyboard (ED707AA)	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country
		Form factor	USB basic Smart Card keyboard
		Colors	Carbonite/Silver
		Dimensions (L x W x H)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
		Weight	2 lb (0.9 kg) minimum

Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI – RFI	Conforms to FCC rules for a Class B computing device
	MicrosoftPC 99 – 2001	Functionally compliant
Mechanical	Languages	30+ available
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
Environmental	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
SMARTCARD function	Support	All ISO 7816 smart cards
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)
	Chipset	SCM STCII
	Standard APIs supported	PC/SC, EMV2000, SET
	Power	USB Port
		Short circuit detection (protects smart card and reader)
		Power supply compliant with ISO7816 and EMV (5V, 60 mA)
		Supports 3-V and 5-V cards
	Power consumption	250-mA maximum draw (50 mA for the keyboard with three LEDs ON and 200-mA maximum startup current using a high-current, 60-mA smart card)

	Communication	From card	Programmable from 9,600 baud to 115,200 baud
		From computer	Up to 38,400 baud
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	USB communications through USB port SCM protocol Automatic card insertion/removal detection	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	89/336/CEE guideline
		USA	USAFCC part 15
Operating system support	Microsoft® Windows® 2000, Windows XP Home, Windows XP Professional, xpe, ce.net, Linux, XP-64		
Approvals	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, JITC, EMV2000, USB-IF		
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, TUVGS		
Kit contents	Keyboard, I/O Security and Documentation CD, , warranty card		
Smart card compatibility	HP	HP ProtectTools Smart Card	
	American Express	Amex Blue	
	Axalto (Schlumberger)	Cryptoflex 8K Cryptoflex 16K Cryptoflex 32K Cryptoflex 32K e-gate Cyberflex Access 64K Cyberflex Access 32K Cyberflex 32K e-gate Cyberflex 64K Cyberflex Palmera Payflex-S Payflex 1K Payflex 2K Payflex 4K Payflex 8K Prismera US DoD CAC	
	Cardlogix	CLXSU004KK4 CLXSU008KK5	
	Datakey	Model 300 Model 330	
	De La Rue	VisaCash	

Gemplus	Gem Expresso GKK32K Gemclub Memo GemClub Micro GemXplore GemSafe
Infineon	SLE66C322P
SafLink (Litronic)	Forte
Sharp	Java Card
Oberthur	CosmopolIIC v4 CosmopolIIC v4.1 Cosmo ID-One GalatIIC v2.1 US DoD CAC
Memory Cards	
Atmel	AT24C01ASC AT24C02SC AT24C04SC AT24C08SC AT24C16SC AT24C32SC AT24C64SC AT24C128SC AT24C256SC AT24C512SC AT88SC153 AT88SC1608
Axalto (Schlumberger)	PrimeFlex Store 8K PrimeFlex Store 2K
nfineon	SLE4406 SLE4406E SLE4406E SE SLE4418 SLE4428 SLE4432 SLE4436E SLE4442 SLE5536
ISSI	IS23SC4418 IS23SC4428
ST	14C02
Telefonkarte	SLE4406 SLE4436 SLE5536
XICOR	X24026

Technical Specifications - Peripherals

HP 2-Button Scroll Mouse (PS/2)	Scroll Wheel	8 mm	
	Maximum Rotation Speed	30 mm/s	
	Switch Type	Light force micro-switch	
	Switch Life	1 million operations	
	Mechanical Life	Minimum 200,000 revolutions	
	Environmental	Operating temperature	50° to 122° F (10° to 50° C)
		Non-operating temperature	-22° to 140° F (-30° to 60° C)
		Operating humidity	10% to 90% (non-condensing at ambient)
		Non-operating humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, 6 surfaces
		Non-operating shock	80 g, 6 surfaces
		Operating vibration	2 g peak acceleration
		Non-operating vibration	4 g peak acceleration
	Mechanical	Resolution	400 ± 20% DPI
		Tracking speed	10 in/s maximum
		Acceleration	100 in/s
		Switch actuation	85 g nominal peak force
		Switch life	1,000,000 operations (using Hasco modified tester)
		Cable length	6 ft (1.8 m)
		PC98-99	Mechanically compliant
	Regulatory approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BCIQ, C-Tick	

HP 2-button Optical Scroll Mouse (USB)	Dimensions (H x L x W)	1.5 x 4.5 x 2.5 inches; 3.8 x 11.6 x 6.3 cm
	Weight	0.27 lb (0.12 kg)
	Cable length	72.8 inches; 185 cm
	System requirements	Microsoft Windows XP, Red Hat Enterprise Linux WS 3, Red Hat Enterprise Linux WS 4

Technical Specifications - Peripherals

HP Optical 3-Button Mouse (USB)	**Dimensions/Weight**	**Height**	1.5 inches; 3.6 cm
		Length	4.5 inches; 11.56 cm
		Width	2.2 inches; 6.19 cm
		Weight	3.80 oz (108 g)
	Environmental	**Operating temperature**	32° to 104° F (0° to 40° C)
		Non-operating temperature	-4° to 140° F (-20° to 60° C)
		Operating humidity	10% to 90% (non condensing at ambient)
	Mechanical	**Tracking speed**	6 in/s Maximum
		Switch life	3,000,000 operations
		Switch type	Micro-switches
		Tracking mechanism life	155 miles (250 km) at average speed of 10 in/s
		Cable length	6 feet; 1.8 m
Spaceball 5000 (USB - (Windows XP Only)	**Physical characteristics**	**Dimensions** (H x W x D)	3.0 x 6.0 x 8.4 inches; 7.6 x 15.2 x 21.3 cm
		Ball Diameter	2.2 inches; 5.6 cm
		Weight	2.1 lb (9.94 kg)
		Features	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw) Certified for leading CAD and DCC applications
	Environmental	**Operating temperature**	50° to 104° F (10° to 40° C)
		Non-operating temperature	43° to 140° F (6° to 60° C)
		Operating humidity	8% to 80% (non-condensing at ambient)
		Non-operating humidity	5% to 80% (non-condensing at ambient)
	Mechanical	**Buttons**	12 programmable (unshifted)
		Ball Force Range	0.5 - 8.2N/1.8 - 29.5 oz
		Ball Torque Range	0.085 – 0.33 oz-in. (6.91 Nmm)
		Resolution	10 bits
	Serial Specifications	**Connector**	USB 1.1 or greater
		Cable Length	12.8 ft. (3.9 m)
		Data Rate	USB model – 16 msec
		Flow Control	Xon/Xoff (on PS/2 model only)
	Software Drivers Available	**USB model**	Microsoft Windows XP Professional
	System Requirements	**Disk Space**	10 MB free disk space
	Regulatory Approvals	UL, cUL, EN 950, EN 60950, CSA, FCC, CE Mark, TUV, CISPR 22, EN 50082, IEC 1000 4-2, IEC 1000-4-3, AS/NZS, VCCI, BSMI, C-Tick	

Technical Specifications - Peripherals

HP SpaceMouse Plus (USB – Windows XP Only)	**Physical characteristics**	**Dimensions** (H x W x D)	7.4 x 4.72 x 1.73 inches; 18.8 x 12.0 x 4.4 cm
		Cap Diameter	2 x 6.5 x 6.6 mm
		Weight	1.5 lb (0.68 kg)
		Features	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw) Certified for leading CAD and DCC applications
	Environmental	**Operating temperature**	41° to 140° F (5° to 60° C)
		Non-operating temperature	-13° to 158° F (-25° to 70° C)
		Operating humidity	10 to 98 % RH (non-condensing)
		Non-operating humidity	10 to 98 % RH (non-condensing)
	Mechanical	**Buttons**	11 programmable (unshifted)
		Cap Force Range	0.2 N – 4.5 N
		Cap Torque Range	4 Nmm to 100 Nmm
		Resolution	8 bit
	USB Specifications	**Connector**	USB 1.1 or greater
		Cable Length	6.56 ft (2 m)
		Data Rate	16 msec
	Software Drivers Available	Microsoft Windows XP Professional	
	System Requirements	**Disk Space**	10 MB free disk space
	Regulatory Approvals	UL, cUL, EN 950, EN 60950, CSA, FCC, CE Mark, TUV, CISPR 22, EN 50082, IEC 1000 4-2, IEC 1000-4-3, AS/NZS, VCCI, BSMI, C-Tick	
HP SpacePilot (USB – Windows XP Only)	**Physical Characteristics**	**Dimensions** (L x W x H)	9.3 x 5.6 x 2.0 inches; 236 x 143 x 53 mm
		Weight	1.875 lb (0.85 kg)
		Palmrest	Sculpted
	Mechanical	**Buttons**	21+ programmable speed keys 15 reprogrammable
		LCD Viewing Area (W x H)	4.0 x 1.0 inches; 102.4 x 30.2mm
		Active Area (W x H)	3.7 x 1.0 inches; 93.4 x 26.2mm
		Display Format	240 x 64
		Motion Controller	Six degrees of freedom motion control through the X, Y, Z axis (pitch, roll, yaw)
		Device Sensitivity	Adjustable to preference
	System Requirements	USB 1.1 or 2.0	
	Operating System Supported	Microsoft Windows XP, not supported in Linux	
	Regulatory Approvals	FCC, CE	

Technical Specifications - Optical Devices

48X CD-ROM Drive	Capacity	700 MB CD disc	
	Dimensions (HxWxD)	1.63 x 5.83 x 7.27 inches; 4.13 x 14.6 x 18.5 cm	
	Weight	1.76 lb (0.8 kg)	
	Interface	ATAPI/EIDE	
	Mounting Orientation	Horizontal or vertical	
	Data Transfer Rates - Read	Digital audio extraction (minimum) - 1,200 KB/s (8X) CD read - up to 7,200 KB/s (48X)	
	Media and Formats - Read	Formats	CD-DA, CD-ROM (Mode 1 and 2), CD-XA Ready, Photo CD (Single and Multi-session), Mixed Mode (Audio and Data combined), CD-I (FMV), CD Plus, CD-Extra
		Media	stamped, CD-R, CD-RW
	Data Transfer Modes	PIO Mode 4 (16.6 MB/s); Multi-word DMA mode 2 (16.6 MB/s); UltraDMA Mode 0 (16.7 MB/s); UltraDMA Mode 2 (33.3 MB/s)	
	Access Times (typical reads, including settling)	Random	< 75 ms @ 48x
		Full-Stroke	< 150 ms
	Start-up Time (typical)	< 7 s (single session)	< 30 s (multisession)
	Stop Time (typical)	< 4 s	
	Read Buffer size	128 KB (minimum)	
	Audio Output	Line-Out	0.7 VRMS
		Signal-to-Noise Ratio	80 dB
		Channel Separation	65 dB
	Configuration Jumper Block	Master, slave, and cable select modes	
	Operating Conditions (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Humidity	10% to 80%
	Approvals/ Environmental	UL 1950 (US and Canada), CSA, SEMKO, TUV; CE, FDA, FCC, IC, C-TICK	
	Operating Systems Supported	Microsoft XP Professional, and XP Professional x64 Edition, Red Hat Enterprise Linux WS 3, Red Hat Enterprise Linux WS 4	
	Supplied Software	None	
16X/40X DVD-ROM Drive with +R Read Support	Height	5.25-in, half-height, tray load	
	Interface Type	ATAPI/EIDE	
	Dimensions (W x H x D)	5.88 x 1.71 x 7.87 [max] inches; 149.5 x 43.25 x 200.0 [max] mm (external, excluding bezel)	
	Disc Formats	DVD-ROM (single and dual layer); DVD-video; DVD-R version 1.0 and 2.0; DVD-RW version 1.0 and 1.1; DVD-R multi-border; DVD+RW; DVD+R ; CD-ROM Mode 1 and 2; CD-DA; CD-ROM XA Mode 2, Form 1 and 2; CD-extra; CD-text; CD-I Mode 2, Form 1 and 2; CD-I ready; video CD, CD-bridge; PhotoCD (single and multi-session); CD-R; CD-RW	

Technical Specifications - Optical Devices

Disc Capacity	DVD-ROM	4.7 GB (DVD-5), 8.54 GB (DVD-9), 9.4 GB (DVD-10), 3.95 GB (DVD-R version 1.0), 4.7 GB (DVD-R version 2.0), 4.7 GB (DVD-RW version 1.0 and 1.1), 4.7 GB (DVD+RW), 4.7G (DVD+R)
	CD-ROM	540 MB (Mode 1, 12 cm), 640 MB (Mode 2, 12 cm), 700 MB (80 minimum CD-R and CD-RW), 180 MB (8 cm)
Access Times (typical reads, including settling)	DVD-ROM Single Layer	120 ms
	CD-ROM Mode 1	90 ms
	Full Stroke DVD	240 ms (seek)
	Full Stroke CD	160 ms (seek)
	Startup Time	< 10 seconds (typical)
	Stop Time	< 4 seconds
	Data Transfer Modes	PIO Mode 4 (16.6 MB/s); Multi-word DMA mode 2 (16.6 MB/s); UltraDMA Mode 3 (44.4 MB/s)
Maximum Data Transfer Rates	CD-ROM Read	6000 KB/s (40X) Max
	DVD-ROM Read	21,600 KB/s (16X) Max
	Digital Audio Extraction	6000 KB/s (40X) Max
Power	Source	Four-pin, DC power receptacle
	DC Power Requirement	5 VDC ± 5% – 100 mV ripple p-p
		12 VDC ± 5% – 200 mV ripple p-p
	DC Current	5 VDC – <800 mA typical, < 1000 mA maximum
		12 VDC – < 870 mA typical, <1800 mA maximum
Audio Output	Line-Out	0.7 VRMS
	Signal-to-Noise Ratio	85 dB
	Channel Separation	65 dB
Configuration Jumper Block	Master, slave, and cable select modes	
Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
Operating Environmental (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)
	Relative Humidity (operating)	10% to 85%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)
Certifications, Approvals	MMC II support, multi-read certification, Microsoft WHQL certification, ACA AS/NZS 3548 class B, CNS 13438, C.I.S.P.R. Pub 22, TUV or VDE EN60950, EN 55022, EN55024, EMKO EN60950, EN 60825-1, UL 60950, CSA C22.2 60950-2000, CFR 21 part 1040 class 1, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, ANSI C63.4-1992	
Operating Systems Supported	Windows XP Professional, and XP Professional x64 Edition, Red Hat Enterprise Linux WS 3, Red Hat Enterprise Linux WS 4	
Kit Contents	16X/40X DVD-ROM Drive, Roxio Cineplayer Component software, audio cable, and installation guide	

48X Combo CD-RW/DVD-ROM	Form Factor	5.25-inch, half-height, tray-load	
	Mounting Orientation	Horizontal or vertical	
	Interface	ATAPI/EIDE	
	Dimensions (HxWxD)	5.77 x 1.71 x 7.87 [max] inches; 14.66 x 4.34 x 20.0 [max] cm (external, excluding bezel)	
	Weight (max)	2.6 lb (1.2 kg)	
	Read Only Disc Parameters	Formats and Modes Supported	CD-ROM-Mode 1; CD-ROM XA-Mode 2 (forms 1 and 2); CD-Bridge; CD digital audio; CD Extra; CD-I-Mode 2 (forms 1 and 2) and CD-I-Ready; Photo CD (single and multi-session); video CD; DVD (single- and double-layer); DVD-R; DVD-RW; DVD-RW Multi-Border; DVD+R; DVD+R Multisession , and DVD+RW
		Capacity	180 MB (mode 2, 8 cm); 540 MB (mode 1, 12 cm); 650 MB (mode 2, 12 cm); 700 MB (Mode 2, 12 cm); 4.7 GB (DVD-5); 8.54 GB (DVD-9); 9.4 GB (DVD-10)
		CD-ROM, CD-R, CD-RW read	7200 KB/s (48X) Max
		DVD ROM read	21,632 KB/s (16X) Max
	Writeable Disc Parameters	Disc Type	CD-R and CD-RW
		Write Methods	Disc at Once, Track at Once, Session at Once, Variable Packet, Fixed Packet
		Format and Modes Supported	CD-ROM (mode 1); CD-ROM XA (mode 2, forms 1 and 2); CD digital audio, CD-I (mode 2, forms 1 and 2); video CD; CD-Bridge; Video CD
		Capacity	180 MB (mode 2, 8 cm); 540 MB (mode 1, 12 cm); 650 MB (mode 2, 12 cm); 700 MB (mode 2, 12 cm)
		CD-R write	7200 KB/s (48X) Max
		CD-RW write	4800 KB/s (32X) Max
	Access Times (typical reads, including settling)	Random DVD	< 140 ms
		Random CD	< 125 ms, (typical)
		Full Stroke DVD	< 250 ms
		Full Stroke CD	< 210 ms
		Startup Time (single)	< 7 seconds (typical)
		Startup Time (multi-session)	< 30 seconds (typical)
		Stop Time (typical)	< 4 s
		Cache Buffer	2 MB (minimum)
		Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 44 Mbytes/s (default)

	Power	Source	Four-pin, DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
			12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC (< 1000 mA typical, < 1600 mA maximum)
			12 VDC (< 600 mA typical, < 1400 mA maximum)
		Total Drive Power (standby mode)	< 2.5 Watt
	Audio Output	Line-Out	0.7 VRMS
		Signal-to-Noise Ratio	74 dB
		Channel Separation	65 dB
	Configuration Jumper Block	Master, slave, and cable select modes	
	Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
	Operating Conditions (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
		Relative humidity	10% to 90%
		Maximum wet bulb temperature	86° F (30° C)
	Certifications, Approvals	MPC-3 compliant, multi-read requirements, ATA Spec X3T9.2, ATAPI Spec SFF-8020, ANSI C63.4-1992, UL 1950, ACA AS/NZS 3548, CB Bulletin No. 96A, CSA C22.2 No. 950-1995, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, EMKO-TSE 07/94, TUV EN60950, EN60825-1, MIC, BSMI-CNS 13438, CE, Microsoft PC2001 certification, Microsoft Logo for Windows XP.	
	Operating Systems Supported	Windows XP Professional, and XP Professional x64 Edition, Red Hat Enterprise Linux WS 3, Red Hat Enterprise Linux WS 4	
	Supplied Software (for Windows XP)	48X Combo CD-RW/DVD-ROM Drive, Roxio DigitalMedia Plus v7.2, Roxio Cineplayer Component, Dantz Retrospect Express 7.0, audio cable, and installation guide.	
16X DVD+/-RW LightScribe drive	Form Factor	5.25-inch, half-height, tray-load	
	Orientation	Either horizontal or vertical	
	Interface	ATAPI/EIDE	
	Disc Recording Capacity	8.5 GB DL or 4.7 GB standard	
	Dimensions (HxWxD)	5.9 x 1.7 x 8.0 inches; 15.0 x 4.4 x 20.3 cm	
	Weight (maximum)	2.6 lb (1.2 kg)	
	Write Speed (maximum)	DVD+R	Up to16X
		DVD+RW	Up to 4X
		DVD+R DL	Up to 2.4X
		DVD-R	Up to 8X
		DVD-RW	Up to 4X
		CD-R	Up to 40X
		CD-RW	Up to 24X

Technical Specifications - Optical Devices

Read Speed (maximum)	DVD+R/-R/+RW/ -RW/+R DL	Up to 8X
	DVD-ROM	Up to 16X
	CD-ROM, CD-R	Up to 40X
	CD-RW	Up to 32X
Access Times (typical reads, including settling)	Random	DVD: < 130 ms (typical), CD: < 120 ms (typical)
	Full Stroke	DVD: < 240 ms (seek), CD: < 200 ms (seek)
	Startup Time	Single-session: < 15 seconds (typical), Multi-session: < 30 seconds (typical)
	Stop Time	< 4 seconds
	Cache Buffer	2 MB (minimum)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
Power	Source	Four-pin, DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, < 1600 mA maximum)
		12 VDC (< 600 mA typical, < 1400 mA maximum)
	Total Drive Power (standby mode)	< 2.5 Watt
Audio Output	Line-Out	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Operating Conditions (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative humidity	10% to 90%
	Maximum wet bulb temperature	86° F (30° C)
System Configuration	Intel Pentium III Processor or later with 128 MB of memory (required); 256 MB recommended 2-D or 3-D graphics cards on primary disk drive for operating system and application software; second disk drive for audio and video data	
Operating Systems Supported	Windows XP Professional, and XP Professional x64 Edition Red Hat Enterprise Linux WS 3 and WS 4 (lightscribe functionality excluded)	
Regulatory Approvals	MPC-3 compliant, multi-read requirements, ATA Spec X3T9.2, ATAPI Spec T13.1153D, ANSI C63.4-1992, UL 1950, ACA AS/NZS 3548, CB Bulletin No. 96A, CSA C22.2 No. 950-1995, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, EMKO-TSE 07/94, TUV EN60950, EN60825-1, MIC, BSMI-CNS 13438, CE, Microsoft PC2001 certification, Microsoft Logo for Windows XP.	
Option Kit contents	16X DVD+/-RW LightScribe drive, Roxio DigitalMedia Plus v7.2, Roxio MyDVD Component, Roxio Cineplayer Component, Dantz Retrospect Express 7.0, installation guide, and DVD+R media.	

NVIDIA Quadro NVS 285, 128 MB Dual Head (Part# RD069AA)

Form Factor	Low profile, both ATX and low profile brackets included
Graphics Controller	Integrated Quadro 285 2D graphics processor unit (GPU)
Bus Type	PCIe
RAMDAC	Dual 350 MHz (integrated)
Memory	128 MB DDR (64 MB local frame buffer plus 64 MB of shared system memory via TurboCache technology) NOTE: The graphics card uses part of the total system memory (RAM) for graphics performance. System memory dedicated to graphics performance is not available for other use by other programs.
Connectors	DVI DMS-59 to dual DVI Y-cable and DMS-59 to dual-VGA Y-cable
Dimensions	Low-profile, 2.586 x 6.6 inches; 6.57 x 16.76 cm
Controller clock speed	250 MHz
Color depth	32 bits/pixel max
Overlay planes	One 16-bit Video overlay plane
Maximum pixel clock	350 MHz
Multi-monitor support	Dual analog or digital monitors
Single DVI Support	Yes
Dual DVI Support	Yes
High-definition Video Processor (HDVP)	Full screen, full frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
Available graphics drivers	Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode), Graphics drivers for Red Hat Enterprise Linux WS 3, and Red Hat Enterprise Linux WS 4 HP qualified drivers may be preloaded or available from the HP support Web site: http://www.hp.com/country/us/en/support.html?pageDisplay=drivers

Analog Resolution	Maximum Colors Supported	Maximum Refresh Rate
640 x 480	16.7 M	240 Hz
800 x 600	16.7 M	240 Hz
1024 x 768	16.7 M	240 Hz
1152 x 864	16.7 M	170 Hz
1280x1024	16.7 M	150 Hz
1600 x 1200	16.7 M	100 Hz
1920 x 1080	16.7 M	85 Hz
1920 x 1200	16.7 M	85 Hz
1920 x 1440	16.7 M	75 Hz
2048 x 1536	16.7 M	60 Hz
Digital Resolution	Maximum Colors Supported	Maximum Refresh Rate
640 x 480	16.7 M	75 Hz
800 x 600	16.7 M	75 Hz
1024 x 768	16.7 M	75 Hz
1152 x 864	16.7 M	60 Hz

1280 x 1024	16.7 M	60 Hz
1600 x 1200	16.7 M	60 Hz
1900 x 1200	16.7 M	60 Hz

NVIDIA Quadro NVS 440, 256 MB Quad Head
(Part# PT453AA)

Form Factor	ATX
Graphics Controller	2 nv43 2D graphics processor units (GPUs)
VGA controller	Integrated into the Quadro GPU
Bus Type	PCI-E x16
RAMDAC	Dual 350 MHz
Memory	256 MB DDR frame buffer and Texture storage (128MB per GPU)
Connector	Two DMS-59
Controller clock speed	250 MHz
Color planes	32-bit color buffer
Overlay planes	1 16-bit Video overlay plane
Maximum pixel clock	350 MHz
Multi-Monitor Support	Up to 4 analog or digital monitors
Single DVI Support	Yes
Dual DVI Support	Yes
High-definition Video Processor (HDVP)	32-Bit color 2048 x 1536 @ 60 Hz maximum resolution 2D rendering engine optimized for 32-, 24-, 16-, 15-, and 8-bpp modes
High-definition Video Processor (HDVP)	Full-screen, full-frame video playback of HDTV and DVD content DVD-ready motion compensation for MPEG-2 Independent hardware color controls for video overlay Hardware color-space conversion (YUV 4:2:2 and 4:2:0) IDCT motion compensation 5-tap horizontal by 3-tap vertical filtering 8:1 up/down scaling
Available graphics drivers	Microsoft Windows XP (Provides full native Dual View mode, Span or Big Desktop mode, and Clone mode) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.

*NOTE: Graphics card uses "reduced blanking" timing and may not work with all panels at this resolution.

Technical Specifications - Graphics

NVIDIA Quadro FX 560, 128 MB (Part# ES354AA)	Form Factor	ATX
	Graphics Controller	NVIDIA NV73GL
	Bus Type	PCI-Express x16
	Memory	128 MB 600 MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 DVI-I + 9-pin HDTV output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Dual 400 MHz integrated
	Architecture features	128-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated antialiased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Single Link DVI enabling driving digital displays up to 1920x1200 (60Hz)
	Shading architecture	Fully programmable GPU Long fragment programs (up to 65,536 instructions) Long vertex programs (up to 65,536 instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	Supported graphics APIs	OpenGL 2.0 DirectX 9.0
	Available graphics drivers	Microsoft Windows XP Professional, Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. Qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.
	Maximum Resolution	Dual DVI-I output - drives dual digital displays at resolutions up to 1920x1200 @ 60Hz. Internal 400MHz RAMDACs - drives dual analog displays up to 2048x1536 @ 75Hz each

ATI FireGL V3300, 128 MB (Part# ES353AA)	Form factor	ATX
	Bus type	PCI-Express x16
	RAMDAC	Dual 10-bit per channel 400 MHz
	Memory	128 MB DDR unified frame buffer, Z-buffer and Texture storage
	Connectors	Dual DVI-I analog/digital, dual VGA analog support with DVI-to-VGA adapters.

Display resolution support	Analog support for 2048x1536 @ 85 Hz on each output connector. Digital support for 1920x1200 @ 60 Hz on each output connector.

Additional product features

Image quality features	• 2x/4x/6x Anti-aliasing modes; multi-sample algorithm with gamma correction, programmable sparse sample patterns, and centroid sampling • 2x/4x/8x/16x Anisotrophic Filtering modes; up to 128-tap texture filtering • High resolution texture support (up to 4K x 4K) • Hardware supported overlays, antialiased points and lines, 2 sided lighting, occlusion culling
Avivo video and display platform	• 64-Bit per pixel floating point HDR supported throughout the pipeline, includes support for blending and multi-sample anti-aliasing • 32-Bit integer HDR (10:10:10:2) format supported throughout the pipeline, includes support for blending and multi-sample anti-aliasing
Programmable video processor	• Accelerated MPEG-2, MPEG-4, DiVX, WMV9, VC-1 and H.264 decoding and transcoding • Seamless pixel shader integration with video in real-time
Display output	• 16-bit per channel floating point HDR and 10 bit per channel DVI output • Programmable piecewise linear gamma correction, color correction, and color space conversion (10-bits per color) • Complete independent color controls and video overlays for each display • High quality pre- and post-scaling engineers with underscan support for all outputs • Content-adaptive de-flicker filtering for interlaced displays • Spatial/temporal dithering enables 10-bit color quality on 8 and 6-bit displays • VGA mode support on all outputs
Shader Engine	• Supports Microsoft DirectX 9.0 Shader Model 3.0 programmable vertex and pixel shaders in hardware • Full speed 128-bit floating point processing for all shader operations • Dedicated branch-execution units for high performance dynamic branching and flow control • Dedicated texture address units for improved efficiency • Up to 128 simultaneous pixel threads • Multiple Render Target (MRT) support • Render to vertex buffer support
Supported graphics APIs	OpenGL 2.0, Microsoft DirectX 9.0
Available graphics drivers	HP-tested Windows XP HP-tested Linux HP qualified drivers may be preloaded or available from the HP support web site: http://h20000.www2.hp.com/bizsupport/TechSupport/Product.jsp?prodTypeId=12454&prodCatId=296719&locale=en_US&taskId=135

Technical Specifications - Graphics

NVIDIA Quadro FX 1500, 256 MB (Part# ES355AA)	Form Factor	ATX
	Bus Type	PCI Express x16
	Memory	256 MB 625 MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 9-pin HDTV output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Dual 400 MHz integrated
	Architecture features	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated antialiased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 3840x2400 (24Hz)
	Shading architecture	Fully programmable GPU Long fragment programs (up to 65,536 instructions) Long vertex programs (up to 65,536 instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	Supported graphics APIs	OpenGL 2.0 DirectX 9.0
	Available graphics drivers	Microsoft Windows XP Professional, Linux – Full Open GL implementation, complete with NVIDIA and ARB extensions. Qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.
	Maximum Resolution	Dual DVI-I output – drives dual digital displays at resolutions up to 1920x1200 @ 60Hz (single-link) and 3840x2400 @ 24Hz (dual-link). Internal 400 MHz RAMDACs – drives dual analog displays up to 2048x1536 @ 75Hz each

ATI FireGL V7200, 256 MB (Part# ES356AA)	Form factor	ATX
	Bus type	PCI-Express x16
	RAMDAC	Dual 10-bit per channel 400 MHz
	Memory	256 MB GDDR3 graphics memory with unified frame buffer, Z-buffer and Texture storage and a 512-bit Ring-Bus memory controller

Connectors	Dual DVI-I analog/digital, dual VGA analog support with DVI-to-VGA adapters. The DVI-I digital connectors are Dual Link capable. Stereoscopic 3D output connector with quad buffer support, HD Component Video (YPrPb) output with optional adapter.
Display resolution support	Analog support for 2048x1536 @ 85Hz on each output connector. Digital support for 1920 x1200 @ 60Hz on each output connector. Dual Link digital support for 2560 x 1600 @ 60Hz. Ideal for 30-inch widescreen displays. NOTE: Stereo supported on single display only.

Additional product features

Ring Bus memory controller	• 512-bit internal ring bus for highly efficient memory reads • Programmable intelligent arbitration logic
Image quality features	• 2x/4x/6x Anti-aliasing modes; multi-sample algorithm with gamma correction, programmable sparse sample patterns, and centroid sampling • 2x/4x/8x/16x Anisotrophic Filtering modes; up to 128-tap texture filtering • High resolution texture support (up to 4K x 4K) • Hardware supported overlays, antialiased points and lines, 2 sided lighting, occlusion culling
Avivo video and display platform	• 64-Bit per pixel floating point HDR supported throughout the pipeline, includes support for blending and multi-sample anti-aliasing • 32-Bit integer HDR (10:10:10:2) format supported throughout the pipeline, includes support for blending and multi-sample anti-aliasing
Programmable video processor	• Accelerated MPEG-2, MPEG-4, DiVX, WMV9, VC-1 and H.264 decoding and transcoding • Seamless pixel shader integration with video in real-time
Display output	• 16-bit per channel floating point HDR and 10 bit per channel DVI output • Programmable piecewise linear gamma correction, color correction, and color space conversion (10-bits per color) • Complete independent color controls and video overlays for each display • High quality pre- and post-scaling engineers with underscan support for all outputs • Content-adaptive de-flicker filtering for interlaced displays • Xilleon TV encoder for high quality analog support • Spatial/temporal dithering enables 10-bit color quality on 8 and 6-bit displays • VGA mode support on all outputs
Shader Engine	• Supports Microsoft DirectX 9.0 Shader Model 3.0 programmable vertex and pixel shaders in hardware • Full speed 128-bit floating point processing for all shader operations • Dedicated branch-execution units for high performance dynamic branching and flow control • Dedicated texture address units for improved efficiency • Up to 512 simultaneous pixel threads • Multiple Render Target (MRT) support • Render to vertex buffer support
Supported graphics APIs	OpenGL 2.0, Microsoft DirectX 9.0

	Available graphics drivers	HP-tested Windows XP HP-tested Linux HP qualified drivers may be preloaded or available from the HP support web site: http://h20000.www2.hp.com/bizsupport/TechSupport/Product.jsp?prodTypeId=12454&prodCatId=296719&locale=en_US&taskId=135
NVIDIA Quadro FX 3500, 256 MB (Part# ES357AA)	Form Factor	ATX
	Bus Type	PCI-Express x16
	Memory	256 MB 700 MHz GDDR3 SDRAM unified frame buffer, Z-buffer and Texture storage
	Connectors	2 dual-link DVI-I + 3-pin Mini DIN stereo output
	Display resolution support	Dual integrated analog display controllers supporting up to two analog displays at 2048x1536 @ 85Hz on both displays or dual digital displays at 1920x1200 (single-link) and 3840x2400 (dual-link). NVIEW advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows
	RAMDAC	Dual 400 MHz integrated
	Architecture Features	256-bit memory interface 128-bit IEEE floating-point precision graphics pipeline 128-bit color precision 12-bit sub-pixel precision 8x FSAA at 1920x1200, 4x at 2048x1536, rotated grid FSAA sampling algorithm Hardware accelerated antialiased points and lines Hardware OpenGL overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes 3rd generation occlusion culling 3D volumetric texture support Quad-buffered stereo Dual Link DVI enabling driving digital displays up to 3840x2400 (24Hz) SLI Link
	Shading Architecture	Fully programmable GPU Long fragment programs (up to 65,536 instructions) Long vertex programs (up to 65,536 instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	Supported Graphics APIs	OpenGL 2.0 DirectX 9.0
	Available Graphics Drivers	Microsoft Windows XP Professional; Linux - Full Open GL implementation, complete with NVIDIA and ARB extensions. Qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/eng/software_drivers.html.
	Maximum Resolution	Dual DVI-I output – drives dual digital displays at resolutions up to 1920x1200 @ 60Hz (single-link) and 3840x2400 @ 24Hz (dual-link). Internal 400MHz RAMDACs – drives dual analog displays up to 2048x1536 @ 75Hz each

NVIDIA Quadro FX 4500, 512 MB with optional G-Sync (Part# EA762AA)	Bus Type	PCI Express x16
	RAMDAC	Dual 400 MHz integrated
	Memory	512 MB GDDR3 SDRAM unified graphics memory
	Connectors	2 DVI-I analog/digital monitor outputs, 1 3-pin Mini DIN stereo output, DVI-I to VGA adapters included
	Display resolution support	Dual integrated display controllers supporting up to 2048x1536 @ 75Hz (analog) or 3840x2400 @ 41Hz (digital) on both displays
	NVIDIA Quadro FX 4500 Architecture	256-bit memory interface 35.2GB/sec. memory bandwidth Full 128-bit floating point color precision 12-bit subpixel precision 65,536 fragment instruction 65,536 vertex instruction 3D volumetric textures Single-system powerwall 12 pixels per clock rendering engine Hardware accelerated antialiased points & lines Hardware OpenGL® overlay planes Hardware accelerated two-sided lighting Hardware accelerated clipping planes Hardware two-sided lighting 3rd-generation occlusion culling OpenGL quad-buffered stereo Hardware-Accelerated Pixel Read-Back
	Shading Architecture	16 textures per pixel in fragment programs Window ID clipping functionality Hardware accelerated line stippling Fully programmable GPU (OpenGL2.0/DirectX 9.0c class) Long fragment programs (up to 65,536 instructions) Long vertex programs (up to 65,536 instructions) Looping and subroutines (up to 256 loops per vertex program) Dynamic flow control Conditional execution
	High Level Shader Languages	Optimized compiler for Cg and Microsoft HLSL OpenGL 2.0 and DirectX 9.0c support Open source compiler
	High-Resolution Antialiasing	12-bit subpixel sampling precision enhances AA quality Rotated-grid full-scene antialiasing (RG FSAA) 16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolution up to 1920 x 1200
	Display Resolution Support	Dual Dual Link DVI-I output-drives digital displays at resolutions up to 3840 x 2400 @ 41Hz Internal 400 MHz DACs – Two analog displays up to 2048x1536 @ 75 Hz each
	nView Architecture	Advanced multi-display desktop & application management seamlessly integrated into Microsoft Windows.

Optional G-Sync	Delivers Frame lock/Genlock functionality to unprecedented levels of industrial realism, visualization and collaborative capabilities. Frame lock allows the display channels from multiple workstations to be synchronized, thus creating one large "virtual display" that can be driven by a multisystem cluster for performance scalability, while Genlock allows the graphics output to be synchronized to an external source, typically for film and broadcast video applications. The NVIDIA Quadro G-Sync requires an NVIDIA Quadro FX 4500 graphics controller and an available expansion slot.
Supported Graphics APIs	OpenGL 2.0 ICD with immediate mode support for all OGL primitive types DirectX 9.0c
Available Graphics drivers	Microsoft Windows XP, Linux – Full Open GL implementation, complete with NVIDIA and ARB extensions. HP qualified drivers may be preloaded or available from the HP support web site: http://welcome.hp.com/country/us/eng/software_drivers.html

HP L1955 Flat Panel Monitor	Panel	Type	Active matrix, thin film transistor (TFT)
		Viewable Image Area (diagonal)	19 inches; 48.25 cm maximum viewable
		Screen Opening (WxH)	14.9 x 12.0 inches; 38.0 x 30.5 cm
		Viewing Angle (typical)	176 degrees horizontal/176 degrees vertical (10:1 minimum contrast ratio)
		Brightness (typical)	Up to 250 nits (cd/m^2)
		Contrast Ratio (typical)	Up to 1000:1 (typical)
		Response Rate (typical)	<16 ms (typical rise + fall)
		Pixel Pitch	0.294 mm
		Color Depth Support	16.7 million colors
	Video/Other Inputs	Plug and Play	Yes (supports VESA DDC2B; PC2001 compliant)
		Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)
		Input Signal	Two connectors: one 15-pin mini D-sub analog VGA; and one DVI-I (VGA analog or digital)
		Input Impedance	75 ohms ± 2%
		Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green (activated through on-screen display)
		Video Cable	VGA to VGA, DVI-D to DVI-D, and DVI-I to VGA
		Video Cable Length	78 in (2.0 m)
	Signal Interface/ Performance	Horizontal Frequency	30 to 82 kHz
		Vertical Frequency	56 to 75 Hz
		Native Resolution	1280 x 1024 @ 75 Hz analog 1280 x 1024 @ 60 Hz digital
		Maximum Resolution (Analog)	1280 x 1024 @ 75 Hz analog
		Maximum Resolution (Digital)	1280 x 1024 @ 75 Hz digital
		Preset VESA Graphic Modes (non-interlaced)	640 x 480 @ 60 Hz, 72 Hz, 75 Hz 720 x 400 @ 70 Hz 800 x 600 @ 60 Hz, 72 Hz, 75 Hz 1024 x 768 @ 60 Hz, 70 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz
		Preset MAC Mode	832 x 624 @ 75 Hz 1152 x 870 @75 Hz
		Preset VGA Mode	640 x 480 @ 60 Hz, 72 Hz
		Preset SUN Mode	1152 x 900 @ 76 Hz
		Fail Safe Mode	Yes (limits out of range signal messages)
		Maximum Pixel Clock Speed	140 MHz
		User Programmable Modes	Yes, 15
		Anti-Glare	Yes

	Anti-Static	Yes
	AssetControl	Yes (accessible on HP Compaq Business Desktops featuring Intelligent Manageability)
	Default Color Temperature	Yes (6500k, 9300k, SRGB, Custom User)
On Screen Display (OSD) Controls	Buttons or Switches	Power on/off; 3-button OSD; second level OSD buttons include dual-input switch, dedicated auto adjust switch
	Languages	English, Spanish, French, German, Italian, Japanese, Simplified Chinese
	User Controls	Size and Positioning
		Contrast
		Brightness
		Clock, Clock Phase
		Selectable Color Temperature
		Serial Number
		Mode Displayed
		Sleep Timer
		Input Selection
		Factory Reset
		Individual Color Contrast
		Full-screen Resolution
Power	Power Supply	Auto-ranging, 90 to 265 VAC; internal power supply
	Input Power	100 ~ 240 VAC
	Nominal Current	1.5 A maximum
	Frequency	50 ~ 60 Hz
	Average	33 watts when displaying standard office software
	Typical Power Consumption	< 40 watts
	Maximum	< 60 watts
	Power Saving	< 2 watts
	Off Mode	0 watts (when master power switch is in the off position)
	Power Cable Length	70 inches; 1.8 m; non-captive

Mechanical	Dimensions (H x W x D)	Unpacked with stand	16.8 (minimum) to 22.3 (maximum) x 15.9 x 8.3 inches; 42.7 (minimum) to 56.6 (maximum) x 40.4 x 21.1 cm
		Base Area (Footprint D x W)	8.3 x 12.2 inches; 21.1 x 30.9 cm
		Panel only (without stand) (H x W x D)	13.2 x 15.9 x 3.1 inches; 33.5 x 40.4 x 7.9 cm
	Weight	Unpacked with stand	16.5 lb (7.5 kg)
		Unpacked without stand	10.5 lb (4.75 kg)
		Packaged	23.5 lb (10.7 kg)
	Bezel Width	13 mm left and right, 14 mm top, and 15 mm bottom	
	Tilt Range	-5° to +35°	
	Swivel Range	± 50° horizontal swivel	
	Height Adjustable	Yes (5.1 in/13 cm adjustment range)	
	Pivot Rotation	Yes, 90 °	
	Base	Ships detached and is removable after installation	
Environmental	Temperature – Operating	41° to 95° F (5° to 35° C)	
	Temperature – Non-operating	-4° to 140° F (-20° to 60° C)	
	Humidity – Operating	20% to 80%	
	Humidity – Non-operating	5% to 95%	
	Altitude – Operating	0 to 13,000 ft (0 to 4,000 m)	
	Altitude – Non-operating	0 to 40,000 ft (0 to 12,192 m)	
Options	Desktop Access Center	Features integrated microphone/headset jacks, dual function headset for phone/PC support, a MultiBay slot for adding an optical drive (sold separately), and four USB ports for easy integration of third-party digital solutions. Sold separately; part number DK985A. For more information, refer to the HP Desktop Access Center QuickSpecs.	
	HP Flat Panel Speaker Bar	Powered directly by the monitor, seamlessly attaches to the monitor's bezel to bring full multimedia support to select HP flat panel monitors. Features dual speakers with full sound range and external jack for headphones. Sold separately, part number PF804AA. For more information, refer to the HP Flat Panel Speaker Bar QuickSpecs.	

	Other	Accessories Included	VGA to VGA cable, DVI-D to DVI-D cable, DVI-I to VGA cable, USB cable, user CD-ROM with Pivot Pro software
		Software	Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.
		Software	HP Display LiteSaver feature lets you schedule Sleep mode at preset times to help protect the display against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.
		User Guide Languages	English
		Warranty Languages	English
		Color	Carbonite, two-tone carbonite and silver (EMEA only)
		VESA Mounting	Yes (swing arm/wall mount not included); base must be removed for mounting options)
		VESA External Mounting	Yes (standard 4 hole pattern, 100 mm)
		Kensington Lock-ready	Yes
	Certification and Compliance	Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Energy Star Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 13406-2 Compliant (Pixel Defect Guidelines), Mexican NOM Approval, MPR-II Compliant, PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 99 or 03 depending on region (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification	
	Compatibility	VESA Video Signal Standard (VSIS) Compliant video cards have been tested and proven compatible for use with the HP L1955 Flat Panel Monitor. Recommended for use with HP products.	
	Service and Warranty	Limited three-year parts and repair labor, service provider labor, and on-site service. Next Business Day advanced exchange direct replacement service available during warranty period. Certain restrictions and exclusions apply. For details, contact HP Customer Support.	
HP Flat Panel Monitor LP2065	Panel	Type	20-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	20.1 in (51 cm)
		Screen Opening (W x H)	16.2 x 12.17 inches; 41.1 x 30.9 cm
		Viewing Angle (typical)*	Up to 178° horizontal/178° vertical (10:1 minimum contrast ratio)
		Brightness (typical*	Up to 300 nits (cd/m2)
		Contrast Ratio (typical)*	Up to 800:1

	Response Rate (typical)*	8 ms (gray to gray), 16 ms (rise + fall)
	Pixel Pitch	0.255 mm
	Color Depth Support	16.7 million colors
	Backlight Lamp Life (to half brightness)	45K hours
On Screen Display (OSD) **Controls**	**Buttons or Switches**	Input select, auto adjust/OSD up, OSD down, OSD menu select, power
	Languages	English, French, German, Spanish, Italian, Dutch, and Japanese
	User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection, image control (including scaling), and factory reset
Signal Interface/ Performance	**Horizontal Frequency**	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
	Vertical Frequency	48 to 85 Hz (VGA input); 30 to 92 KHz (DVI input for modes with pixel clock less than 157 MHz)
	Native Resolution	1600 x 1200 @ 60 Hz (recommended)
	Preset VESA Graphic Modes (non-interlaced)	1600 x 1200 @ 60 Hz, 75 Hz (VGA input) 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 85 Hz 640 x 480 @ 60 Hz, 75 Hz, 85 Hz
	Text Mode	720 x 400 @ 70 Hz
	Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	Sun Mode	1152 x 900 @ 66 Hz
	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)
	User Programmable Modes	Yes, 10
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K

Technical Specifications - Monitors

Video Input	Plug and Play	Yes	
	Input Signal	Four connectors, including one 15-pin mini D-sub VGA, one DVI-I (VGA analog and digital input), one composite video, and one s-video	
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (cable included)	
	Input Signal	Two DVI-I connectors (dual VGA analog or dual digital input possible)	
	Input Impedance	75 ohms ± 10%	
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green	
	Video Cable	Two VGA to DVI-I; two DVI-D to DVI-I	
	Video Cable Length	5.9 ft (1.8 m)	
Power	Input Power	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz	
	Frequency	47.5 to 63 Hz	
	Typical Power Consumption	55 watts (without USB ports); 70 watts (USB ports fully loaded)	
	Maximum	< 75 W	
	Power Saving	< 2 watts	
	Power Cable Length	5.9 ft (1.8 m)	
Mechanical	Dimensions (H x W x D)	Unpacked with stand	16.7 to 21.8 x 17.4 x 8.67 inches; 42.5 to 55.5 x 44.3 x 22.0 cm
		Unpacked w/o stand (head only)	13.58 x 17.4 x 3.42 inches; 34.5 x 44.3 x 8.7 cm
		Packaged	11.77 x 22.2 x 16.77 inches; 29.9 x 56.4 x 42.6 cm
	Weight	Unpacked	With stand: 20.28 lb (9.2 kg); Without stand: 12.35 lb (5.6 kg)
		Packaged	26.3 lb (11.95 kg)
	Tilt Range	-5° to + 25° vertical tilt	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 in (13.0 cm)	
	Pivot Rotation	Yes	
	Base	Detachable, ships attached	

Environmental	Temperature – Operating	46° to 95° F (10° to 35° C)
	Temperature – Non-operating	6° to 140° F (-10° to 60° C)
	Humidity – Operating	20% to 80% non-condensing
	Humidity – Non-operating	5% to 85%
	Altitude – Operating	+12,000 ft (+3,657.6 m)
	Altitude – Non-operating	+40,000 ft (+12,192 m)
Options	HP Silver Flat Panel Speaker Bar - Part number: EE418AA	Powered directly by the monitor or the PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and external jack for headphones. Sold separately. For more information, refer to the HP Silver Flat Panel Speaker Bar QuickSpec.
Other	Accessories Included	VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #1 or 2 (DVI-I analog) connector. DVI-D to DVI-I cable – connects the graphic card's DVI-D digital connector to the monitor's input #1 or #2 (DVI-I digital) connector.
	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Software	HP Display Assistant Utility makes it possible to adjust displays settings through the PC using two-way communication via DDCI. HP Display Lite Saver allows ability to power up and down display at predetermined hours of the day to safe power and backlight life. Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese.
	User Guide Languages	English
	Warranty Languages	English
	Color	Carbonite/Silver
	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes

	Certification and Compliance	Canadian Requirements/CSA, CE Marking, CISPR Requirements, , Energy Star Compliant, FCC Approval, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval,, MPR-II Compliant, PC2001 Compliant, PC99 Certified, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows XP)
	Compatibility	Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.
	Service and Warranty	Three years parts, labor, and on-site service. 24-hour 365-day 1-800 technical support. Replacement options include 2nd business day on-site service or next business day direct replacement. With direct replacement, HP will ship a replacement display product directly to you. Using the shipping labels provided, return your failed display to HP. Certain restrictions and exclusions apply. For details, contact HP Customer Support.

HP Flat Panel Monitor LP2465	**Panel**	**Type**	24-inch Active Matrix TFT (thin film transistor)
		Viewable Image Area (diagonal)	24 inches; 60.96 cm
		Screen Opening (W x H)	20.47 x 12.83 inches; 52.0 x 32.6 cm
		Viewing Angle (typical)*	178° H/ 178° V (10:1 minimum contrast ratio)
		Brightness (typical)*	500 nits (cd/m^2)
		Contrast Ratio (typical)*	1000:1
		Response Rate (typical)*	8 ms (typical gray to gray)
		Pixel Pitch	0.270 mm
		Color Depth Support	16.7 million colors
		Backlight Lamp Life (to half brightness)	50K hours
		*Response time 13 ms rise and fall, 6 ms gray to gray.	
	On Screen Display (OSD) Controls	**Buttons or Switches**	Input Select, Auto Adjust, OSD Up, OSD Down, OSD Menu Select, Power
		Languages	English, French, German, Spanish, Italian, Japanese, Dutch
		User Controls	Brightness, contrast, positioning, color temperature, individual color control, serial number display, full screen resolutions, clock, clock phase, input selection (includes separate direct access key for dedicated swap between inputs 1 and 2), factory reset

Signal Interface/ Performance	Horizontal Frequency	30 to 94 kHz (VGA input); 30 to 92 KHz (DVI input) (for modes with pixel clock less than 157 MHz)
	Vertical Frequency	48 to 85 Hz (VGA and DVI input)
	Native Resolution	1920 x 1200 @ 60 Hz (recommended) (native aspect ratio of 16:10)
	Preset VESA Graphic Modes (non-interlaced)	1920 x 1200 @ 60 Hz 1600 x 1200 @ 60 Hz, 75 Hz 1280 x 1024 @ 60 Hz, 75 Hz, 85 Hz 1280 x 960 @ 60 Hz 1152 x 900 @ 66 Hz 1024 x 768 @ 60 Hz, 75 Hz, 85 Hz 800 x 600 @ 60 Hz, 75 Hz 640 x 480 @ 60 Hz, 75 Hz
	Text Mode	720 x 400 @ 70 Hz
	Mac Mode	1152 x 870 @ 75 Hz and 832 x 624 @ 75 Hz
	Sun Mode	1152 x 900 @ 66 Hz
	Maximum Pixel Clock Speed	202 MHz (VGA input); 162 MHz (DVI input)
	User Programmable Modes	Yes, 20
	Anti-Glare	Yes
	Anti-Static	Yes
	Default Color Temperature	6500 K
Video/Other Inputs	Plug and Play	Yes
	Self Powered USB 2.0 Hub	One upstream, four downstream ports (located on side of monitor, cable included)
	Input Signal	Two DVI-I (VGA analog and digital) inputs
	Input Impedance	75 ohms ± 10%
	Sync Input	Separate sync (HSYNC/VSYNC); composite sync, Sync on Green
	Video Cable	VGA to DVI-I; DVI-D to DVI-D
	Video Cable Length	5.9 ft (1.8 m)
Power	Input Power	Auto-Ranging, 90 to 132 VAC and 195 to 265 VAC; internal power supply, 50 Hz/60 Hz
	Frequency	47.5 to 63 Hz
	Typical Power Consumption	75 watts
	Maximum	< 110 watts
	Power Saving	< 2 watts
	Power Cable Length	6.2 ft (1.9 m)

Mechanical	Dimensions (H x W x D)	Unpacked w/ stand	14.6 (min) to 19.7 (max) x 22 x 9.1 in (37.1 (min) to 50.1 (max) x 55.4 x 23.2 cm)
		Unpacked w/o stand (head only)	14.4 x 22 x 3.7 in (36.6 x 55.84 x 9.2 cm)
		Packaged	11.7 x 22.1 x 25.6 in (29.8 x 56.0 x 65.1 cm)
	Weight	Unpacked	23.6 lbs (10.7 kg)
		Packaged	23.6 lbs (10.7 kg)
	Tilt Range	-5° to + 25° vertical	
	Swivel Range	-45° to + 45°	
	Height Adjustable	Yes, range 5.1 in (130 mm)	
	Pivot Rotation	Yes	
	Base	Detachable, ships detached	
Environmental	Temperature – Operating	46° to 95° F (10° to 35° C)	
	Temperature – Non-operating	6° to 140° F (-10° to 60° C)	
	Humidity – Operating	20% to 80% non-condensing	
	Humidity – Non-operating	5% to 85%	
	Altitude – Operating	+12,000 ft (+3,657.6 m)	
	Altitude – Non-operating	+40,000 ft (+12,192 m)	
Other	Accessories Included	VGA to DVI-I cable – connects the graphic card's VGA connector to the monitor's input #2 (DVI-I analog) connector DVI-D to DVI-D cable – connects the graphic card's DVI-D digital connector to the monitor's input #2 (DVI-I digital) connector	
	Software	Pivot Pro software from Portrait Displays, Inc. interacts with your PC's native graphics driver to enable seamless portrait screen redraws with a simple mouse-click or keyboard command. Pivot Pro supports 90-degree portrait and landscape views. Language support is available in English, Japanese, French, German, Spanish, Italian, and Traditional and Simplified Chinese. HP Display Assistant is a software utility that allows monitor adjustment, color calibration, and security/asset management using the Display Data Channel Command Interface (DDC/CI) protocol of the connected desktop PC. HP Display LiteSaver feature allows you to schedule Sleep mode at preset times to help protect the monitor against image retention, drastically lower power consumption and energy costs, and extend the lifespan of the monitor.	

	User Guide Languages	English, B. Portuguese, French, LA Spanish, Korean, S. Chinese, T. Chinese, Bahasa, Japanese, Danish, Finnish, German, Norwegian, Spanish, Swedish, Greek, Polish, Russian, Slovenian, Turkish
	Warranty Languages	English, Canadian French, LA Spanish, Brazilian Portuguese, Danish, German, Castilian Spanish, French, Italian, Dutch, Norwegian, Finnish, Swedish, Bahasa Indonesian, Korean, T. Chinese, S. Chinese
	Color	Carbonite/silver
	VESA External Mounting	Yes (Standard 4 hole pattern, 100 mm)
	Kensington Lock-Ready	Yes
Options	HP Silver Flat Panel Speaker Bar - Part number: EE418AA	Powered directly by the monitor or PC, the Speaker Bar seamlessly attaches to the monitor's lower bezel to bring full audio support to select HP flat panel monitors. Features include dual speakers with full sound range and an external jack for headphones. Sold separately. For more information, refer to the HP Flat Panel Speaker Bar QuickSpec.
Certification and Compliance	Australian ACA Approval, Canadian Requirements/CSA, CE Marking, China CCIB/CCEE Approval, CISPR Requirements, Eastern European Approvals, Energy Star Compliant, FCC Approval, German Ergonomic (TUV and GS Mark), ISO 9241-3,7,8 VDT Guidelines, ISO 13406-2 Pixel Defect Guidelines, Mexican NOM Approval, MIC Requirements (New Zealand), MPR-II Compliant, Nordic Approvals (Nemko, Fimko, Demko, Semko), PC2001 Compliant, PC99 Certified, S. Korean MIC Approval, Taiwan BSMI Approval, TCO 03 (emissions, ergonomics, environment), TUV-Ergo, UL Listed, VCCI Approvals, Microsoft Windows Certification (Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows XP)	
Compatibility	Compatible with platforms using the VESA standard video modes. Recommended for use with HP products.	
Service and Warranty	Three years parts, labor, and on-site service. 24-hour, 90-day, toll-free technical support. Replacement options may include second business day on-site service, or next business day direct replacement, at HP's sole discretion. With direct replacement, HP will ship a replacement display product directly to you. Using the prepaid shipping labels provided, return your failed display to HP in the same packaging as the replacement. Certain restrictions and exclusions apply. For details see your product warranty or contact HP Customer Support.	

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Warranty - year(s) Protected by HP Services, including a 3 years parts, 3 years labor, and 3 years onsite service (3/3/3) standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply.